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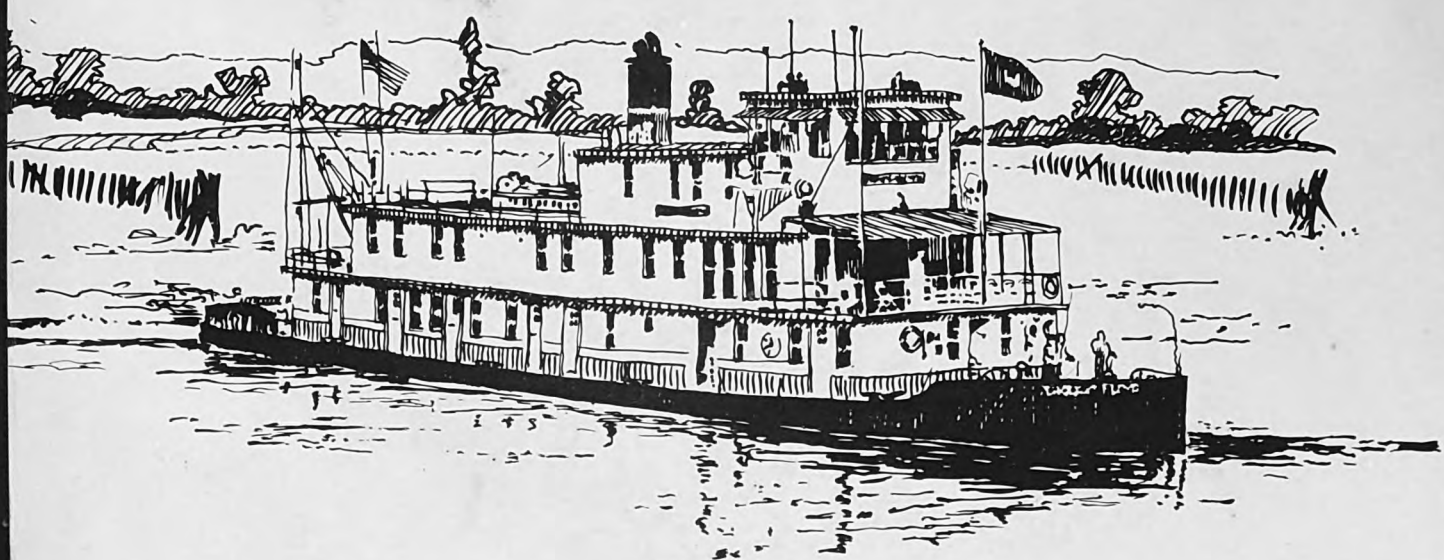
TAMING THE MIGHTY MISSOURI

A HISTORY OF THE KANSAS CITY DISTRICT CORPS OF ENGINEERS 1907-1971



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TAMING THE MIGHTY MISSOURI

A HISTORY
OF THE KANSAS CITY DISTRICT
CORPS OF ENGINEERS
1907-1971

BY
ROBERT L. BRANYAN

U. S. ARMY CORPS OF ENGINEERS
KANSAS CITY DISTRICT
KANSAS CITY, MISSOURI

1974

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FOREWORD

This is the first rendition of a history of the Kansas City District, U.S. Army Corps of Engineers. The Kansas City District was officially created in 1907. This chronicle includes the early history of the area which encompasses the Kansas City District; its accomplishments past and present, and the growth of the District as influenced by the changing requirements and interests of our Nation.

My personal thanks goes to Dr. Robert L. Branyan, Professor of History, University of Missouri at Kansas City, who compiled this history, and to the many members of the Kansas City District who aided him in his endeavors. Many additions will be made to this history as time goes by. Through these pages, let us reflect on our past accomplishments and continue to strive for an even better tomorrow.

W.R. NEEDHAM
Colonel, Corps of Engineers
District Engineer

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PREFACE

Writing an institutional history is fraught with danger. If it is done narrowly with emphasis on specific acts and actors of the agency it tells the story of the institution without relating it to broader issues. This approach might please the people who find themselves or friends mentioned. However, it has little interest to general readers even though they might be intrigued with the broad topic. On the other hand, institutional history can be written in a broader narrative that relates the agency's work to larger regional and national events. I have chosen the latter approach. The Kansas City District's history literally flows from events preceding it and relates to conditions existing all around it. This story, while taking nothing away from the people who carried on the day-to-day tasks, focuses on the larger story of the District's efforts. The fight to tame the mighty Missouri is an exciting and interesting story. I trust that those who read the following pages will feel some of the excitement that I did as the research unfolded.

Many people assisted at all stages of preparation. The District Historical Committee: Norman E. Smith, James J. Pack, Winton K. Sexton, Glenn A. Carriker, Jack C. Herner, Francis T. Gorman, B.E. Borne, and John W. Manning gave me guidance before work began, helped as problems arose and gave criticism on draft chapters. Jesse A. Remington, Chief, Historical Division, Office of the Chief of Engineers, read the whole manuscript, making numerous helpful suggestions. Larry Salyer, a graduate student in history at the University of Missouri-Kansas City researched and produced a draft for the chapter on military construction as well as aiding in photograph selection. The staff at the Missouri Valley Room in the Kansas City Public Library uncovered photographs of several early District headquarters buildings; the National Archives provided several pictures of nineteenth century river work, and the Reproduction Branch, Office of Administrative Services, under John C. Walsh opened their old photographic files to provide the vast majority of the prints seen below. In the final stages, the Illustration Unit of the Engineering Division aided in cover layout and production. Norman Smith, Barbara Lewis, and Alta Fay Jester of the Office of Administrative Services guided me in the right direction on many occasions as did Homer King and Elizabeth Cowden, the helpful staff of the District Library. The manuscript was typed by Claire Hildebrand. Finally my wife, Helen Baird Branyan, devoted several hot summer evenings to proof reading and last minute stylistic changes. All these people contributed to the following volume, but as tradition requires, I must say that I stand responsible for any errors that still remain.

I hope the people who read this story of the Kansas City District's first sixty-four years enjoy it as much as I enjoyed meeting the personnel and writing this book.

Robert L. Branyan
Professor of History
University of Missouri-
Kansas City

Kansas City, Missouri
July 9, 1974

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CONTENTS

Introduction I

Chapter

I Missouri River Navigation 1

II Missouri Valley Floods 41

III Flood Control 64

IV Evolving Activities on the District's Projects 89

V Military Construction 100

Conclusion 123

Bibliographical Note 127,

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INTRODUCTION

It has been noted that the Army Corps of Engineers is "the largest and most highly diversified engineering organization in the world."[1] The claim is easy to believe if one looks at the global scope and incredible breadth of activities undertaken by the Corps. From building air bases in the frozen wasteland of northern Greenland to gigantic missile-servicing towers on the sands of Cape Kennedy, as well as every conceivable kind of flood control or navigation project, the Engineers face and solve almost every construction problem known to mankind. This vast organization—established in 1775, a year before the Declaration of Independence—has used its time well to achieve its present capabilities.

The day before the Battle of Bunker Hill was fought the Continental Congress provided General George Washington with a Chief Engineer and two assistants "in a separate department" to carry out engineering activities. As the war continued, Washington obtained permission to organize a Corps of Engineers. This was accomplished with aid from a number of professionally trained French engineers and by the time of the Battle of Yorktown the Corps was well established. However, the return of peace eliminated the need for military engineers and Congress disbanded and reestablished an engineering department several times over the ensuing years.

It was not until 1802, when President Thomas Jefferson called on Congress to enact legislation creating a "Defense Establishment," that the Corps became permanently established. One of the basic functions of the Engineers was to "Constitute a Military Academy" at West Point, New York; indeed, for sixteen years that post served as the headquarters of the Corps of Engineers. For many years the Military Academy produced literally all the nation's formally trained engineers. These men served both private enterprise and the various levels of government as the young country started to move west. It could be argued that without West Point many projects including the New York State built Erie Canal would not have been completed at all or at least not as quickly.

The transportation and communication needs of society were recognized in 1824 with the passage of a General Survey Act. Now the President could order the Corps to conduct surveys of routes for roads and canals that might be of "national importance in a commercial or military" manner, and to require that plans and estimates for such projects be drawn up. This law launched numerous surveys that identified the best routes for future roads, railroads, and canals as well as identifying rivers where navigation needed improvements and coastal locations that required lighthouses. From 1824 onward the Corps of Engineers became the branch of the Army whose civilian activities were one of its most important functions.

Throughout the rest of the nineteenth century engineering surveys combined with expeditions that improved knowledge about meterology, geology, Indian culture and many other things. While adding to man's store of scientific knowledge, Corps Engineers surveyed routes for transcontinental railroads, opened all the Great Lakes to navigation, developed a successful seagoing hopper dredge capable of deepening Atlantic harbors for larger vessels, and continued to improve navigation on major rivers. So diverse had operations become that the Chief of Engineers reorganized the Corps into five geographic divisions in December, 1888. After this date project directors would report to the Division Engineer. This decentralization allowed for altering divisional boundaries and creating districts within the larger subdivisions that would best solve the changing problems faced by the Corps of Engineers.

Certainly the twentieth century saw no decline in the Corps' activities. The great wars during the first fifty years intensified military construction and combat operations, yet it is the growing involvement in flood control and navigation that are the hallmark of twentieth century Corps. Despite world unrest the obvious need to protect the millions of people

1. General Fact Sheet, U.S. Army, Corps of Engineers, January 1, 1960, p. 7.

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and billions of dollars worth of property in America's great river basins grew acute. This is especially true of the Divisions in the Ohio, Mississippi, Missouri, Columbia, and Sacramento valleys. Most people quickly recognize the turreted castle insignia on the reservoirs that dot the landscape. Because of its location on the lower reaches of the Missouri River, the Kansas City District's history is deeply entwined with the "big muddy."

The use of the Missouri River for navigation dates far back into prehistoric times, although its first great notoriety for the United States occurred when Lewis and Clark ascended the stream on their transcontinental trip in 1804. Improvement started after Congress provided funds for snag removal in 1832. Little was known about how to control a sand bottom river and no formal organization existed to develop a plan. Tree trunks or limbs that might pierce a boat's hull or overhanging branches that could smash the superstructure were obvious hazards and removing them reduced the danger of accidental sinking without improving overall navigation.

Congress took the next step in 1876 when funds were provided for general improvement of the Missouri River. Since there still was no well-defined plan of action, bank protection and channel stabilization were hit or miss. For the next several years a young major in the Corps of Engineers, Charles R. Suter, carried on a survey of the river. In February, 1881, he presented a report that laid out methods to upgrade the river for navigation. Congress accepted Suter's ideas and appropriated $850,000 to commence work in 1882. However, within two years the Congress decided to create a new agency to carry out the improvements, establishing the Missouri River Commission on July 5, 1884. Thus the Corps would not act directly on Major Suter's plan, but at least a formal organization a sort of grandfather to the ultimate district had been formed.

For the next eighteen years the evolution of systematic improvement for navigation on the Missouri involved a good deal of study and a few specific bank stabilization projects. Since Congress required three of the five members of the Commission to be Corps of Engineers officers, the general approach to river work did not change drastically. Indeed, it was to call on the Corps for men and materials to carry out its proposed improvements. Yet in the long run the Commission's independent organization separated it from the top levels of the Corps of Engineers and the officers directly involved in navigation projects. Thus even though this agency took the first systematic look at the Missouri River, it had built-in shortcomings.

When the Congress appropriated funds for river and harbor improvements in 1902 the Secretary of War was ordered to "cause an examination to be made of [the river from Sioux City to the mouth] with a view to ascertaining whether navigation can be obtained at a reasonable cost by dredging and the removal of obstacles." This sentence seemed inconsistent with the words of 1884: "it shall be the duty of said Commission to superintend and direct such improvements of [the Missouri] river." However, the inconsistency lasted for only a few lines. In the next paragraph the Commission was abolished and all authority and real property returned to the Secretary of War.

On July 1, 1902, responsibility for river improvement work in the whole Missouri River basin returned to the Corps as part of the Northwest Division with a District headquarters at Sioux City, Iowa. The Corps could not have regained control at a more inauspicious time. In 1903 Congress failed to appropriate funds for the Missouri River, and in 1904 the River and Harbor Act noted "that no general river and harbor bill is to be enacted during the present session." Therefore all that Congress did was to approve a lump sum to be used for necessary repairs "to preserve [the] normal condition of efficiency existing." Under these circumstances the Sioux City office could do little more than wait for a change of heart in Washington, D. C.

After slightly over five years, during which one of the most disastrous floods in Missouri Valley history took place, the Sioux City office quietly closed down and a new District headquarters was established at Kansas City, Missouri. This move was quite logical since

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the bulk of navigation as well as river improvements had taken place on this lower reach of the Missouri. However, the extreme shortage of funds meant that Kansas City could do little more than Sioux City had done. Yet change was in the offing. River improvements had been ignored because the national railroad network provided quicker and easier transportation than water. By the middle of the first decade of the twentieth century questions were being raised about the railroads. Scandals involving their operations vied with charges that rates were set at "all the traffic would bear," and that inefficient operation had reduced the speed of freight cars to about twenty-five miles per day. Of the numerous solutions to the "railroad problem," one was a revival of inland water transportation. The Kansas City District had not yet been in its new home for three years when Congress committed a million dollars to determine if a six foot channel could be secured from Kansas City to the mouth of the river, a distance of 370 miles. From this time on the importance of navigation continued to grow, while flood control considerations would soon appear as well.

The years between 1907 and 1933 were turbulent ones for the whole world and no less so for the Kansas City District. During this two and one-half decades the Missouri valley grew dramatically in population; commerce and industry increased several times over; and nature's whims alternately overran vast areas with flood waters or baked the land hard with drought. By the early 1930's the entire basin was far too large for a single district—over 2200 miles from Fort Benton to the mouth. Thus in October, 1933, the Missouri River Division was separated from the Upper Mississippi Valley Division and subdivided into three new districts. Kansas City's boundaries were somewhat unusual. Instead of terminating at the mouth of the river, it ended almost one hundred miles upstream near Hermann, Missouri. Even more unusual was the fact that these last miles of the Missouri River were now under the jurisdiction of the St. Louis District of the Upper Mississippi Valley Division. The differing natures of the two streams and the manner in which works had to be constructed had long been obvious. Thus, two years later the boundary was corrected, returning the area from Hermann to the mouth to Kansas City. The year before a smaller adjustment had been made at the upper end of the district. The 1933 limit had been slightly north of St. Joseph, Missouri; in August, 1934, the boundary was placed at Rulo, Nebraska. Thus from October, 1935, until the present the boundaries of the Kansas City District have remained unchanged, while its activities have grown in dramatic fashion.

The moving of the District headquarters must have been like leaving one world and entering another. Sioux City's population had somewhat recovered from the depression years of the 1890's, but it still had not reached 45,000 by 1907. In contrast, Kansas City was in the midst of a fabulous boom. During the decade after the turn of the century it would grow over 51 percent, showing a total population in 1910 of almost 250,000. As the Corps moved into its quarters in the Postal Telegraph Building the staff could look

The District's first home in booming early twentieth century Kansas City was in the Postal Telegraph Company Building.

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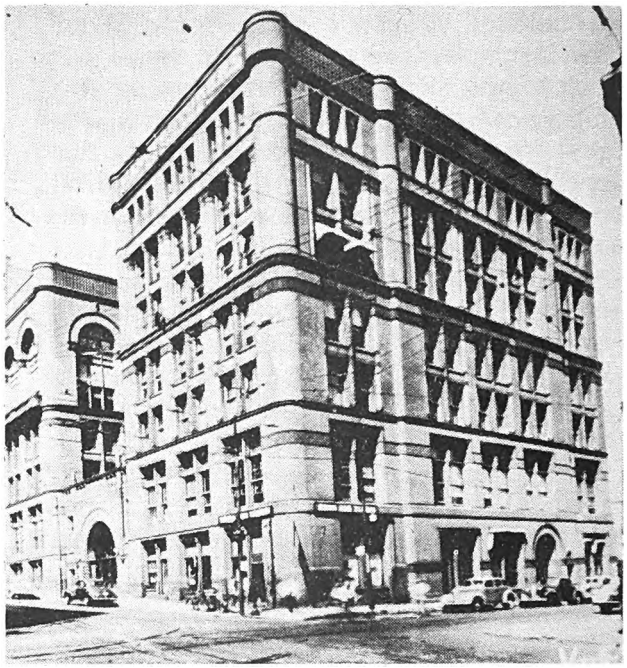

This view of the old Board of Trade Building shows the trading floor in the upper part of the left hand wing. The District leased space here for five years, moving to larger quarters in 1939.

one block south on Delaware Avenue to the busiest corner in town—where Main joined Delaware and crossed Ninth. On the north side of the building Kansas City's elevated streetcars rumbled by the whole length of the structure. Surely the staff found their new home in bustling downtown Kansas City a sharp contrast to their former headquarters.

The Postal Telegraph Building served as headquarters of the Corps for longer than any other place. For twenty-seven years the sturdy old building—it had been constructed in 1898—served its purpose well. Then in 1934 new quarters were obtained in one of Kansas City's handsomest and most prestigious landmarks. The Board of Trade had built a veritable "cathedral of commerce" on west Eighth street in 1887, and had occupied it during the halcyon days of economic expansion. After the Board of Trade moved to even larger quarters in 1925 the building quickly became an important general office building known as the Manufacturers Exchange Building. For five years the Engineers would share this architectural masterpiece of the "Chicago School" with many of the city's most important firms.

In 1939 the District moved as far away from the river as it would ever be. Although much-needed space was obtained in a shift to Seventeenth and Main, the Davidson Building

For sixteen years, the Kansas City District called the Davidson Building at 17th and Main its home.

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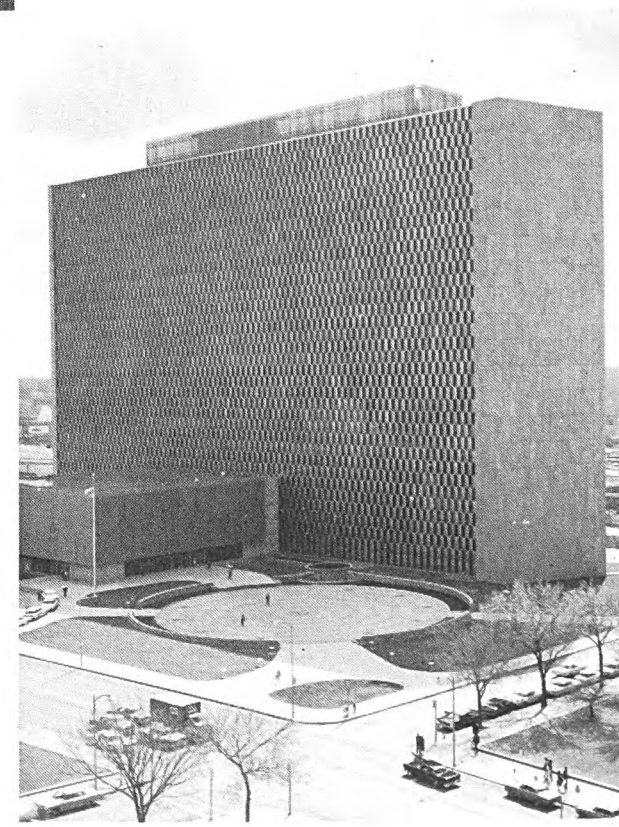
The twin towers of old Fidelity National Bank had become an important part of Kansas City's skyline long before the Corps took up residence. Even after most of the District's staff moved to the "new" building, the photographic reproduction branch stayed on at the "Old Federal Building".

few suites to old tenants. In 1955, when the Corps moved into the twin towered skyscraper it had to displace another agency. Even so, the 911 Walnut address made finding the Corps or any other agency easier since most Kansas Citians knew the "Federal Building" well.

Eleven years later the Fidelity National Bank started to be called the "Old Federal Building." This occurred after a "New" Federal Building opened in the Central Business District's new "government quarter." This structure, started in 1963, and massive by any standards, added a totally new feature to an already impressive skyline. Looming on the east side of downtown, the building pro-

did not compare in style to the old home. However, matters of style are unimportant when a nation is at war and workloads skyrocket for everyone. For sixteen years the Davidson Building address remained headquarters for the Kansas City District. When the next move took place it was to a building already crowded with Federal agencies. The Fidelity National Bank Building had been planned in the boom days of the 1920's and built shortly after the Crash. Sadly, the bank failed in the early thirties, but happily the structure became available as a general office building as the nation recovered. At first the Federal Government leased a few floors; by 1950 it had purchased the building, renting a



The Federal Building now serves as headquarters for the District. Floors six, seven and eight are occupied by the Corps.

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vides a low silhouette that seems to betray its actual great size. The addition of a state office building across the street, along with the older City Hall and County Court House nearby, makes an impressive and convenient "government section" for local citizens. Even with more space than ever before, the Corps found itself cramped as the numerous demands on its time and staff increased.

The overall number of employees of the Kansas City District has varied greatly. In the early days when it was responsible for the whole Missouri River and when the vast majority of work was done by hand, the number of people in the field reached many hundreds. After the District's boundaries were set from Rulo to the mouth, cutting the District's mileage by about three-fourths, the force needed on navigation projects dropped dramatically. In addition, the war eliminated almost all funds for river activities and the Corps turned to directing military construction. In the postwar era, however, navigation and expanded flood control activities required a dramatic increase in professional personnel. As the vast number of dams, navigation improvements, agricultural levees, and urban flood control projects advanced, the need for engineering as well as support staff grew rapidly, although the total number of employees would decline as actual construction went more and more to contractors. By the early 1970's the Position Charts—issued at six month intervals—listed the numerous subdivisions that had become necessary to carry out the District's missions. In addition, the necessity for "paper-work" had increased as the Federal bureaucracy grew. Thus, by 1971 the nearly 1,000 people spent their time and efforts planning, directing and inspecting the work of numerous civilian contractors.

The Kansas City District is organized on a "line-and-staff" basis. This technique has tended to work well for large agencies that have a great many productive activities as well as a sizeable amount of administrative responsibility. The "line" involves the authority which extends from the top policy-making personnel down to the lowest element that carries out an assignment. In a "line," responsibility starts at the top and there is less chance of confusion over assignments at various levels. Normally the "line" units are directly involved in carrying out the missions of the District. On the other hand, "staff" units cut across the "line" and perform the numerous support activities needed to keep a larger organization functioning.

The individual responsible for keeping the organization in operating condition is the District Engineer. Thirty-four men served in this capacity from 1907 until the end of 1971. In rank, they varied from Captain to Brigadier General, in times of command at Kansas City, from a maximum of almost five years to a minimum of sixteen days for a regular appointment and three days for an acting commander; and in their military careers most had served in numerous engineering positions in the United States and overseas. A few examples of their far-flung activities would be: extension of the DEW Line across Greenland's ice cap, building the Alkan highway, undertaking the Passamaquoddy Tidal Power Survey, and working on the Nicaraguan Canal Survey.

A large number of District Engineers attended the Military Academy at West Point, while many others graduated from various universities throughout the country. In recent years, almost every one has also completed a masters degree in engineering, and often they have served as high ranking officers of professional engineering societies. Typical of what a District Engineer faced can be seen in the biographical sketch done for one of Kansas City's commanders as he took over the District:

> Colonel Lawrence J. Lincoln was assigned as District Engineer of the Kansas City District, Corps of Engineers, U.S. Army, in July 1950. He has charge of the flood control and river development work of the Corps in this District, as well as the maintenance and improvement of the Missouri River channel from Rulo, Nebraska, to the mouth a few miles above St. Louis, Mo., and the construction of agricultural levees along both banks of that stream between those points. The District in its flood control activity comprises an area of more than 110,000 square miles and includes

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Colonel Lawrence J. Lincoln was typical of the well trained engineers who commanded the Kansas City District. A graduate of West Point, he also earned a Master's Degree in Civil Engineering from Princeton University. He served in Southeast Asia during World War II, in Korea after that conflict, and as Deputy Chief of Staff of the Joint Task Force Seven at the 1948 atomic tests in the Pacific. In August 1948, he became Theater Engineer, U.S. Army Forces, Pacific. From this post, he came to the Kansas City District.

roughly two-thirds of the State of Missouri, approximately the northern half of Kansas, a portion of southwestern Iowa, the southern half of Nebraska, and the eastern third of Colorado. In addition, the Kansas City District has supervision of the military construction in Kansas and Missouri. The military program includes major construction at five large air bases, three large army posts, three Ordnance Arsenals, and numerous other facilities.

The following is a listing of the Kansas City District Engineers and their terms of service:

Name	From	To
Maj. Edward H. Schultz	1 Dec 07	12 Aug 12
Lt. Col. Herbert Deakyne	13 Aug 12	31 Dec. 15
Col. C. McD. Townsend	1 Jan 16	17 Jan 16
Lt. Col. J. F. McIndoe	18 Jan 16	31 May 17
Brig. Gen. William H. Bixby	1 Jun 17	31 Aug 17
Col. Willard Young	1 Sep 17	30 Jun 19
Maj. R. T. Ward	1 Jul 19	14 Aug 20
Maj. Gilbert Van B. Wilkes	1 Aug 22	31 Jul 22
Maj. Cleveland C. Gee	1 Aug 22	15 Jul 27
Maj. Gordon R. Young	16 Jul 27	24 Jun 30
Lt. Col. Richard C. Moore (Acting)	25 Jun 30	15 Oct 30
Capt. Theodore Wyman, Jr.	16 Oct 30	2 Jan 34
Capt. O. E. Walsh	3 Jan 34	1 Aug 35
Capt. J. M. Young	2 Aug 35	3 Jul 36

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Lt. Col. P. A. Hodgson	4 Jul	36	31 Jul	38
Capt. Heath Twichell (Acting)	1 Aug	38	4 Aug	38
Col. A. M. Neilson	5 Aug	38	1 Apr	42
Col. Francis H. Oxx	2 Apr	42	15 Sep	42
Col. R. Selee	16 Sep	42	1 Jan	43
Col. R. E. M. Des Islets	2 Jan	43	29 May	44
Lt. Col. S. G. Neff	30 May	44	21 Aug	45
Col. W. E. Potter	22 Aug	45	7 Mar	48
Col. P. D. Berrigan	8 Mar	48	23 Jul	50
Col. L. J. Lincoln	24 Jul	50	20 Jul	53
Col. E. C. Adams (Acting)	21 Jul	53	6 Oct	53
Col. Keith R. Barney	7 Oct	53	11 Jan	55
Col. E. C.Adams	12 Jan	55	19 Jul	57
Col. L. E. Laurion	20 Jul	57	6 Nov	60
Col. Andrew P. Rollins, Jr.	7 Nov	60	5 Jun	63
Lt. Col. K. M. Hatch (Acting)	6 Jun	63	23 Jun	63
Col. Miles L. Wachendorf	24 Jun	63	14 Jul	66
Col. W. G. Kratz	15 Jul	66	17 Jan	69
Col. R. L. Anderson, Jr.	17 Jan	69	30 Aug	71
Col. W. R. Needham	31 Aug	71		

The work carried out by the District staff and private contractors alike constitutes the history of the Kansas City District.

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CHAPTER I: Missouri River Navigation

The Missouri River was first seen by a white man in 1673 when the French explorer Father Pere Marquette came across its mouth while traveling on the Mississippi River. As explorers and fur traders moved up the river they found a remarkable stream. The Missouri, generally assumed to be Indian for "River of Mud" or "Muddy River," wandered over a broad valley in great bends and reaches. Often the river could be a mile wide and a foot or so deep. Indeed, early navigators soon found that the bottom moved almost as much as the surface. What would one day be a sand bar could be a deep pool the next. Such a river, despite its great advantages as a highway into the nation's interior, was a dangerous route.

The fur trappers who plied the river had little need for deep water. They used either Indian type canoes or the flat bottom bateau, both of which were easily portaged. The normal route for the trappers during the early days went down the Missouri River to a point about fifteen miles above the mouth and then by portage to the Mississippi, taking it, the Wisconsin, and the Fox Rivers to Lake Michigan. After Laclede established St. Louis, an increasing proportion of the furs went to that city for trans-shipment down to New Orleans or up the Ohio River.

The first vessels of any size to ascend the Missouri were those manned by the Lewis and Clark Expedition in 1804. These intrepid explorers proved the usability and value of the river, which soon saw larger and larger keel boats struggling upstream, propelled by long poles and occasionally small sails. As settlers started to farm the rich soil in the valley they depended on keel boats to bring supplies upriver as well as to take their produce to the St. Louis market. Without greater power, movement up and down the stream was difficult at best and often impossible.

Steam navigation had been developing for quite a number of years on slower moving Eastern rivers, but the power and general dependability of available ships seemed inadequate for the Missouri. Major Stephen H. Long of the Army Engineers, who had led expeditions up the Mississippi River, proposed building a shallow draft steamboat strong enough to fight the Missouri's current and shallow drafted enough to pass over most of its sandbars. After corresponding with both President James Monroe and Secretary of War John C. Calhoun, Long received permission to construct a vessel suited for the Missouri. Calhoun stressed the importance of scientific investigation, and Long spent many months securing an adequate staff. Long's orders were to sail from St. Louis to the mouth of the Yellowstone River—a distance of over 2,000 miles. His small fleet fell far short of its goal. The **Thomas Jefferson** sank near Cote Sans Dessein, less than 150 miles upriver. The **Independence** made it well over 200 miles, while the **Western Engineer** (the boat built under Long's direction) ascended all the way to Council Bluffs, Iowa, almost 700 miles above the mouth. Although Long had not approached the upper reaches of the river, the main point of the expedition had been proved--the Missouri could be navigated with steamboats.

In the years that followed there evolved a breed of craft that met many of the river's requirements. Powerful stern or sidewheel paddles pushed shallow-draft boats ever further up the Missouri and its tributaries. Ultimately it would be said that some of these boats could "sail over a cornfield on a heavy dew!" Step by step the river gave way to navigation. Sioux City was reached in 1856, and only three years later the **Spread Eagle** climbed to within ten miles of Fort Benton, Montana—more than 2200 miles from the mouth. In 1860 the **Spread Eagle** fought all the way to the head of navigation at Fort Benton, opening that city to steamboat navigation. The difficulty of the trip notwithstanding, many vessels followed the **Eagle**, with almost fifty arrivals there during the summer months in the boom years of the 1880's.[1]

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1. George C. Haydon, "The Missouri River and Its Improvements" (mimeographed; Washington, D. C., Office of the Chief of Engineers, 1947), pp. 8-10.

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This mid-1950's view of Missouri City bend shows how much bank stabilization had taken place since the early days, when it was known as Whirling Jones' Bend.

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Guiding vessels around the treacherous bends, over the numerous sandbars, and along the channels in the river's reaches required great skill as well as considerable luck. Steamboat men trained to ascend the river quickly picked up the title "Mountain Pilots," and along with that somewhere between $1,000 and $1,500 per trip. These experts were always in short supply and received special treatment both on the shore and on the river. Their unique value can be seen when it is remembered that a successful round trip to Fort Benton could pay for all expenses and a profit equal to the original value of the boat.

In order to ascend the Missouri safely the pilots needed numerous landmarks. From the earliest days of navigation, bends, reaches, rocks, towns, and many other natural features became important points of reference. Since the river is in many ways a living thing it is not surprising that landmarks changed as the river moved and that some locations would have humorous connections while others would be tragic. Just a few miles from the mouth is an example of the latter. Car of Commerce Chute obtained its name after the sidewheeler, **Car of Commerce**, struck a snag in the area on May 8, 1832, and sank. Further up the river is an example of the changing of identifying names. For many years a section of the channel near the town of Chamois was called Berries Chute for the fruit that lined the bank. Then the **Molly Dozier** ran into trouble and went to the bottom of Berries Chute. Soon after, the area became known as Molly Dozier Chute, as if the pilots wanted the name to remind them of the accident.

Often names reflected historical events, as did Bushwhacker Bend, which received its title after rebel guerillas met near it during the Civil War. One particularly treacherous curve in the river had a name with a dual meaning. Some people said Jackass Bend celebrated the drowning of a preacher's mule after a boat hit a sandbar; others thought that it was because the bend made a "jackass" out of so many pilots! Finally there is a bend where identification rests simply on humor. The story of Whirling Jones Bend went as follows:

> A shack on the left bank was once the residence of a couple named Jones. Once Jones told his wife that if he died and she should be unfaithful to his memory he would turn over in his grave. Jones did die, and about three months later her neighbors started calling Mrs. Jones 'Whirling Jones' widow.' Therefore, the name of Whirling Jones Bend.[2]

As commerce increased on the Missouri, both the size of the steamboats and the frequency of service increased. In 1880, some 332 arrived or departed St. Louis for the Missouri. The trip had become somewhat safer because of government activities. As early as 1824 some money had been provided for snag removal by the Corps of Engineers. Then in 1876 as traffic was setting new records Congress went beyond the "snagging only" requirement calling for "improvement of the Mississippi, Missouri, and Arkansas rivers, one hundred thousand dollars . . . provided . . . that forty thousand dollars of the above sum be expended on the Missouri River, including improvements opposite St. Joseph, Missouri and at Nebraska City."[3] The funds and operations before this date must have been extremely modest since as late as 1884 the **Annual Report** noted that only one snag boat worked on the Kansas City to the mouth reach, and it functioned for only two and one-half months because that was all the "funds available" would justify. Yet this interest came just as the railroads were about to spread their steel webs all over the Missouri valley. Bit by bit freight moved from water to land and when a line opened to Fort Benton in 1887 steamboats soon found the trip unprofitable. As witness to this, the last merchant vessel arrived at Fort Benton in the early 1890's. Almost as quickly as it had

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2. Many similar anecdotes as well as general information of the river from Rulo to the mouth are in Cecil R. Griffith, "The Eventful Missouri River" (mimeographed, no date). A copy is in the historical file of the Kansas City District, Corps of Engineers; additional information on early navigation can be found in a report by Paul D. Barber for the "Environmental Inventory Studies–Missouri River, Rulo-Mouth" (typed, 1972).

3. All references to River and Harbor Acts are from **Laws of the United States Relating to the Improvement of Rivers and Harbors**, from August 11, 1790 to January 2, 1939 (3 Vols.; Washington, D. C.: U. S. Government Printing Office, 1940).

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The equipment available for snagging and removing tree stumps in 1880 was simplicity itself. Two flat bottom boats and a block and tackle were all that were needed for what the photographer called "amature snagging."

Credit: RG 77 Naval Observatory
Photo No. 77-H-Q420-2 in the
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emerged as a great artery of commerce, the Missouri River retreated to an insignificant feeder to the railroads or a carrier of low value, high bulk items like sand.

The great irony of Missouri River navigation is that just as the railroads were stealing the stream's business the first serious comprehensive report on systematic improvement was being completed. Major Charles R. Suter, often referred to as the "master mind" of Missouri River stabilization, concluded that protection of concave bends by revetment, constriction of the prism width, and the removal of snags would create a situation of uniform width, slope and depth. The year after Suter's report in 1881, Congress increased the appropriation for the Missouri to $850,000 and it appeared that river improvements would accelerate dramatically.

However, Congress identified the specific localities in which the work was to be done. This lead to numerous unconnected improvements that seldom withstood the ravages of winter. Residents of the basin met at St. Joseph in 1881 in a Missouri River Improvement Convention. They were pleased that Congress had funded river development and that Suter's plan made navigation technically possible. All that remained was to end "piecemeal" construction. This could occur if a new administrative body outside local political pressure were established to stabilize the river. The delegates were aware of the Mississippi River Commission and thus requested that Congress follow the same pattern for the Missouri.[4] The hoped-for legislation passed in 1884, giving the valley a Commission to systematically upgrade the river. That Major Suter's earlier plans would be carried out was fairly well assured when he was appointed as one of the three Corps of Engineers officers on the five man board. In fact, Suter served as the Commission's president from its creation till the end of 1895.

For the next eighteen years the Commission would implement Suter's plans as well as it could. Although the 1881 report seemed sound, there was little knowledge about how to carry it out. Stabilizing the bank of a sand bottom river obviously required something to hold it in place, but what? Some earlier attempts included the spreading of brush on the bank and then staking it down or holding it in place with rope or wire. This worked reasonably well during the mild part of the year; however, when ice packs ground down the river the brush disappeared. In the same manner timber cribs filled with brush were tried as wing dams without much success. By the mid-1880's the willow mat had become fairly standard. This involved weaving willow limbs into a sturdy mat, sliding it onto the bank and then weighting it down with stones. During the period of the operation of the Commission the willow mattress underwent numerous improvements, proving itself a mainstay of bank stabilization.

A great deal of the Commission's work involved general engineering planning for the river. Indeed, in the summer of 1885 the members traveled to the sources of the Missouri in order to study the changes in the stream as it moved south and east. Many of their basic ideas were sound, but a few were not. An example of the latter would be the recommendation that one bank of the river be forced to a bluff. This would reduce the need for bank protection on the bluff side and seemed logical since the river had once flowed in a similar bed. The problem was that underwater ledges created currents that pulled the stream away from the bluff while attacking the opposite bank. Even with its engineering failures, the Commission was still the first agency to view the Missouri as an integrated whole.

It was this "systematic" review that helped shorten the group's life. Congress continued to designate specific amounts in River and Harbor bills for particular places. This "pork barrel" legislation that pleased the "home folks" and helped reassure reelection of local congressmen brought protests from the Commission. Further, many groups, private and public, on the river pressured for protection of their property without regard to a general program. When the House River and Harbor Committee reviewed the overall Missouri

4. Henry C. Hart, **The Dark Missouri** (Madison: University of Wisconsin Press, 1957), p. 79.

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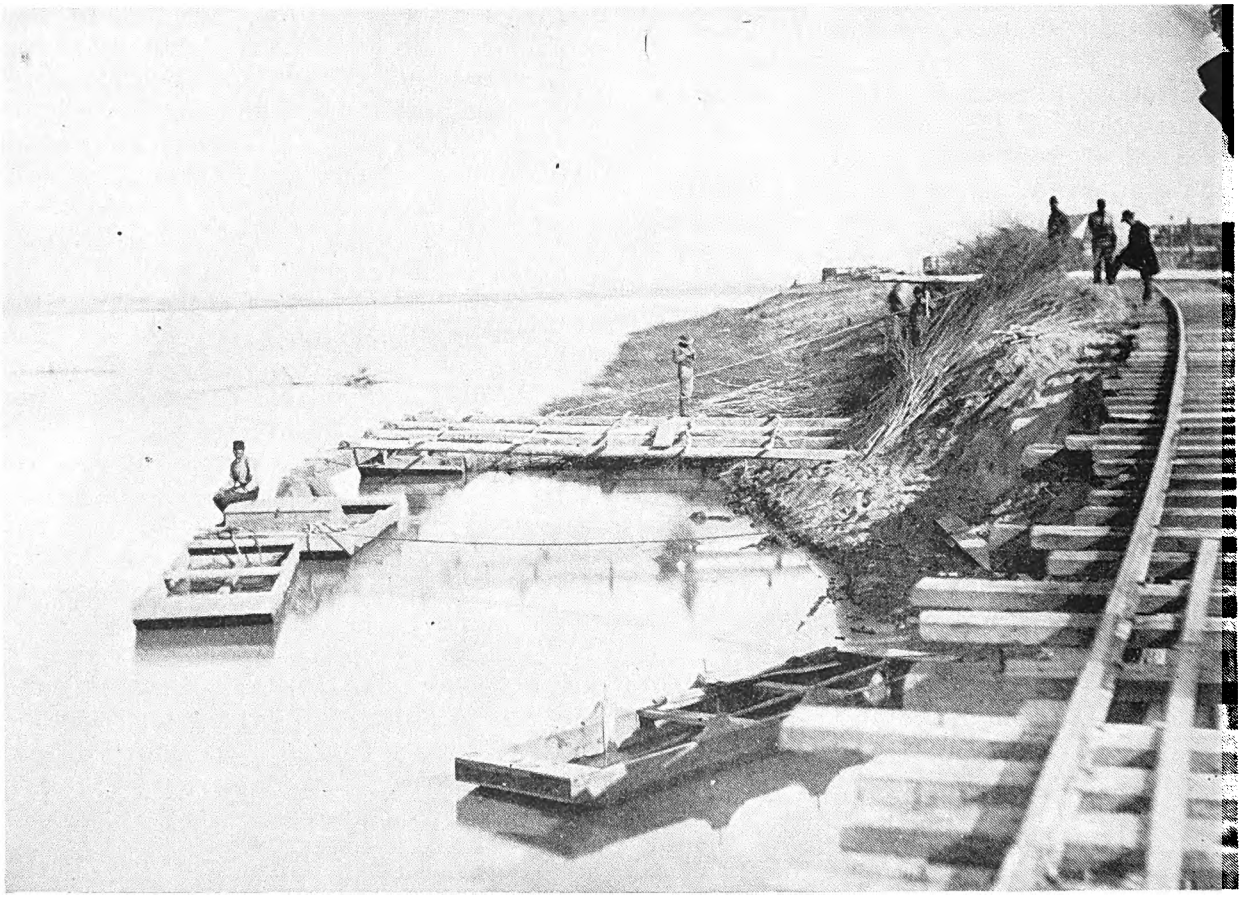

Brush has been staked to the bank near a bridge near Nebraska City in order to stop bank erosion. This 1879 picture indicates the level of technology during this period.

Credit: RG 77 National Observatory
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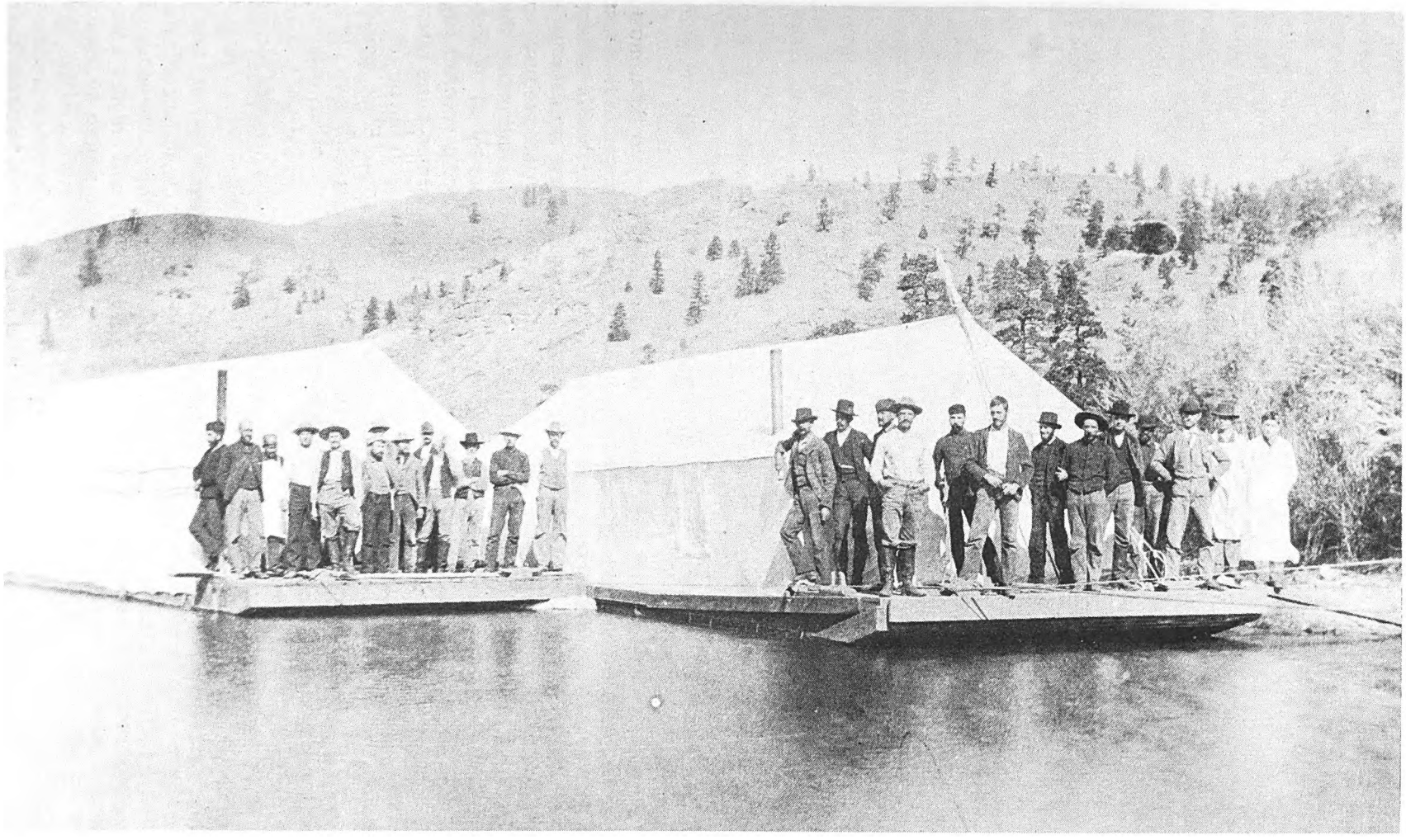

When the Missouri River commissioners traveled on the upper reaches of the Missouri, they might have seen work parties living on quarter boats similar to these. This photograph was taken in 1890 above Fort Benton, Montana, but it was typical of accommodations for river workers.

Credit: RG 77 National Observatory
Photo No. 77-H-Q752-3 in the
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Edward H. Schultz served as District Engineer from 1907 to 1912. His report on improving the river was an outstanding example of how to combine engineering studies and economic surveys.

project, literally no one defended the Commission and its comprehensive objectives. Thus the River and Harbor Act of 1902 "put it out of its misery." Yet there is no doubt that by the turn of the century the Commission had learned a great deal about controlling the Missouri River, had undertaken several bank stabilization projects, and had increased the amount and quality of equipment. A more important question in light of declining use was: should the work continue?[5]

As the Corps of Engineers reestablished its control over the Missouri River, with headquarters at Sioux City, Iowa, events were beginning to unfold that would result in renewed interest in navigation. The rapidly growing population of the Missouri valley had begun to tax railroad capacity to the utmost. At harvest time it was not unusual to find vast piles of grain on the ground beside sidings waiting for freight cars. Worse than the wait was the cost of shipping the product to market. Every farmer was convinced that the railroads were the sworn enemy of agriculture. In Congress debate raged over increasing railroad regulation to give farmers fairer rates. Competition also became one of the means to hold transportation rates down. Some legislators felt railroads competing with each other would have the desired effect; others believed that waterborne commerce would add to rate reductions. In the Great Plains area this meant reviving navigation on the Missouri.

The first step came in March of 1907 when the River and Harbor Act authorized the expenditure of $450,000 for maintenance of navigation on the Missouri and ordered a survey of the river from the mouth to Sioux City. Complying with this request was the final act of the Sioux City office (established as District headquarters for the Missouri River

5. Ibid., pp. 80-81; Proceedings of Missouri River Commission. The original minutes are in the Kansas City District Library. Entries for 1884 and 1885 are handwritten, but after that the proceedings are printed. The volume contains all minutes and some correspondence. The letter protesting "piece meal" construction was dated January 16, 1901.

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in 1902) and the first task undertaken by the Kansas City headquarters. The last officer in charge of Sioux City, Col. James B. Quinn, sent a brief reply to the War Department during June of 1907. He restated the need for more transportation in the Missouri valley, noted the vast area (some 300,000 square miles within 100 miles of each bank) in the valley, and concluded, "I consider this river worthy of improvement."[6]

In dramatic contrast to this short reply, Capt. Edward H. Schultz, the first commander of the Kansas City office, compiled a detailed and comprehensive study showing what had been done in years past and what could be accomplished for future navigation. Captain Schultz outlined a plan for a twelve foot channel from Kansas City to the mouth including total cost, the number of work parties necessary, and the time that would be needed. He also spelled out the requirements for a six foot depth on both the upper and lower reaches of the river. The report not only listed previous surveys, amounts spent and work already done, and the economic growth of the valley, but it presented a logical case for general improvement of river navigation by comparing it with other rivers in the world and arguing for the economic advantages of increased use. A number of items were added as appendices that further strengthened the case by showing that local groups also favored revived navigation. The Congress had asked for a survey; Captain Schultz had given them a well reasoned brief for the river as a whole.[7]

Following normal channels the report was not sent to the House of Representatives until December, 1908. This meant that little implementation could be expected in 1909, since the River and Harbor bill for that year had already been discussed in Committee. In fact, the act of March 3, 1909, did not mention the Missouri River at all. There were not even funds to continue maintenance work while waiting for the report, although another survey was ordered—this time from Sioux City to Fort Benton, Montana. Any disappointment felt by Major Schultz was put to rest when the 1910 River and Harbor Act passed. Congress had endorsed at least part of his plan. One million dollars was appropriated "with a view to securing a permanent six-foot channel between Kansas City and the mouth of the river." An Engineering Board was to report "upon the most economical and desirable plan of securing such [a] channel," but the important fact was the commitment to navigation.

The special board composed of Col. Frederic V. Abbot, Col. C. McD. Townsend and Maj. C. Keller met in Kansas City on September 20, 1910, reviewed records in the District office, and then sailed downstream to the mouth investigating firsthand the condition of the riverbank and other stabilization works. In November a public hearing took place and interested persons gave opinions on improved navigation. Most of those attending strongly supported reviving the stream and controlling the channel by bank stabilization. However, they indicated that few if any landowners on the river had enough money to help the government finance the project. So impressed was the board with the sincerity of the local people that the final report called on Congress to accept total responsibility for all costs.

The manner in which a six-foot channel could be obtained differed considerably from Major Schultz' 1908 report. The Board believed (as had the Missouri River Commission many years before) that work would have to be continuous to be successful. Major Schultz had discussed this, but indicated that isolated improvements might achieve the same results. After consultation the Board and the District Engineer agreed that this was not advisable. The great difference was in cost; isolated improvements could be done for $3,500,000; continuous work would cost $20,000,000. Accepting this latter figure the Board recommended bank stabilization by "the standard woven mat and bank pavement." In addition the report called for narrowing the channel by closing "sloughs and minor channels." Work was to proceed downstream from Kansas City

6. U. S. Congress, House of Representatives, House Document No. 1120, 60th Congress, 2nd Session, 1908.

7. Ibid.

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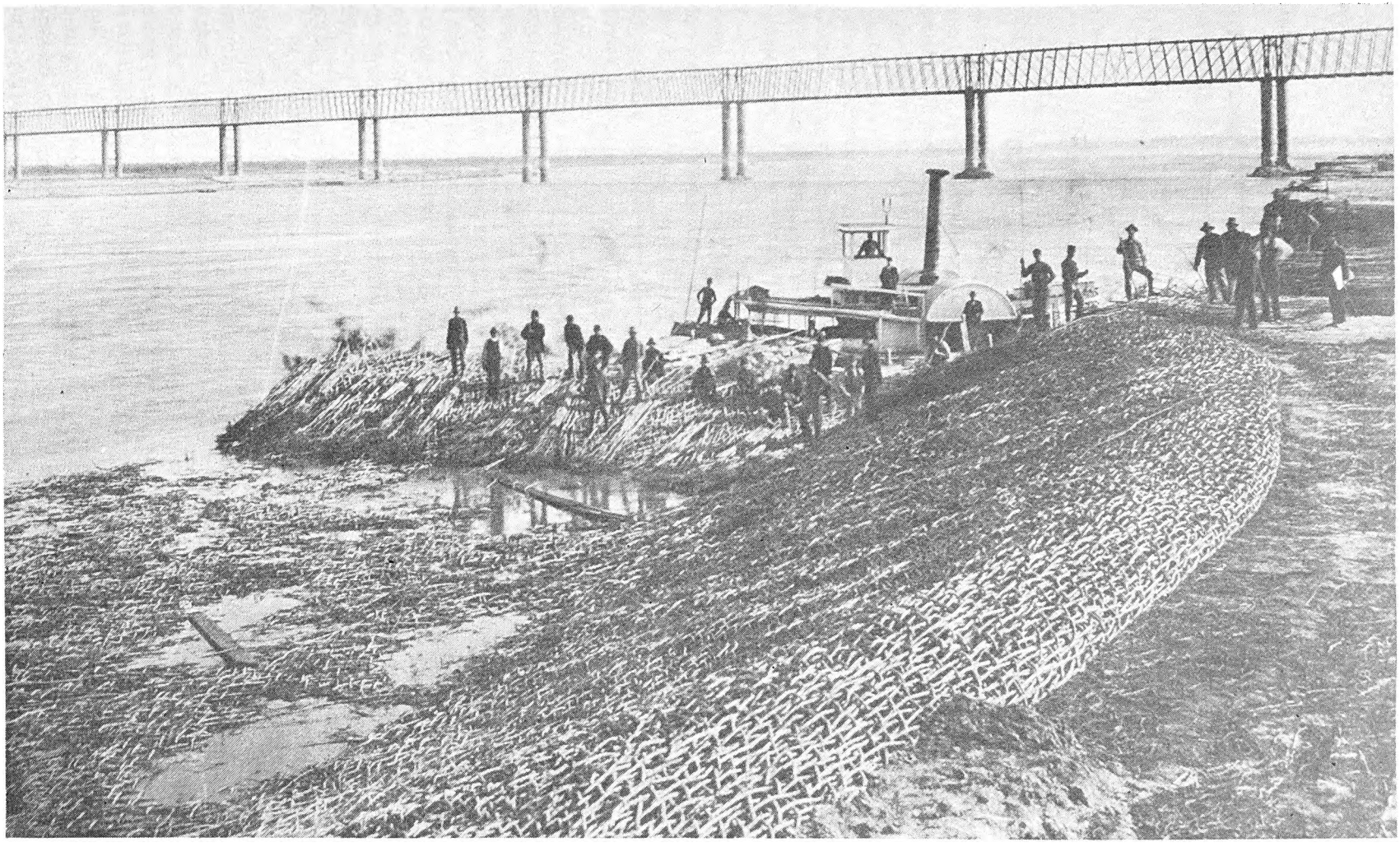

Although taken before Congress authorized the six-foot channel in 1912, this photograph clearly shows "the standard woven willow mat." This project was at Omaha during the summer of 1880.

Credit: RG 77 National Observatory
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in order to assure success. In this regard the Board noted that older isolated projects had been destroyed by shifting sand from upstream. However, it would be possible to start in more than one place if a stable reach existed from which downstream work could begin. Although the cost was vastly higher than Major Schultz thought, his overall view of improvements had clearly been endorsed by the Special Board.[8]

No doubt Major Schultz was even more pleased when the Congress specifically approved the six-foot channel under the guidelines of the Board's report. In the summer of 1912, legislation passed appropriating $800,000 and setting a ten year period to achieve the goal even though neither the Board nor Major Schultz had suggested a complete timetable. The next year $2,000,000 went to the project allowing activities to increase dramatically. In his annual report for the fiscal year ending June 30, 1912, Major Schultz indicated that a good deal of progress had already been made on the project approved 25 days after the fiscal year ended. The work followed his 1908 proposals and had been funded by the increased appropriations and provisional authorization of 1910. In his summary he noted that almost 100,000 feet of revetment and 4,500 feet of dike were under construction at ten different sites between Kansas City and the mouth of the river. A year later the figures were even more impressive: over 140,000 feet of revetment, 8,200 feet of dike, and 1,000 feet of abattis under construction or completed during the fiscal year. As of June 30, 1913, the project was 44 percent complete and "in general the depth along a revetted bank is 6 to 10 feet and the channel is free of snags and obstructions."[9]

While work was getting under way on the lower river Major Schultz was carrying out the survey of the upper reaches as required by Congress in March of 1909. Two reports, July 19, 1909 and December 12, 1910, were made and again the District Engineer compiled a combined study that included the history and the economic future of the area. While accepting that sufficient work to make the stream navigable from Sioux City to Fort Benton was not economically feasible, he suggested $150,000 annually to improve the stretches used for local shipping. The Board of Engineers for Rivers and Harbors agreed with the Major in part, yet it concluded that only one half of the proposed sum be provided. In 1912 Congress reviewed the report, accepted the District Engineer's view, and appropriated the full amount. No systematic improvement would be made on the upper river, but navigation would be improved and cities protected where commerce already plied the waters.[10]

Carrying out Congress' direction that a six-foot channel be completed from Kansas City to the mouth in ten years, soon became an almost impossible task for the District. The Engineers in charge did all they could, but reduction in appropriations on the one hand and the fickle nature of the river on the other slowed progress. In fact Congress ordered a restudy of the whole project in 1915. The District Engineer, Lt. Col. Herbert Deakyne, reported that he did not believe enough commerce would develop to justify the cost. He recommended an end to the program with only a modest annual appropriation to remove snags. This proposal, although supported by the Western Division office in St. Louis, was not accepted by the Board of Engineers for Rivers and Harbors, the Chief of Engineers, or Congress. Yet the report itself showed the tenuous condition of the project.[11] Compounding the problem was the outbreak of World War I in 1914, an event that soon shifted the Army's focus from navigation to the war in Europe. When the United

8. U. S. Congress, House of Representatives, House Document No. 1287, 61st Congress, 3rd Session, 1911.

9. Annual Reports, War Department, Fiscal Year Ended June 30, 1912, Report of the Chief of Engineers U. S. Army, 1912. (Three parts; Washington, D. C., U. S. Government Printing Office), pp. 832-34. Hereafter these reports will be cited as Annual Report (with date).

10. U. S. Congress, House of Representatives, House Document No. 91, 62nd Congress, 1st Session, 1911. The Board was part of the Corps' organization that provided for additional review of reports originating in the various districts.

11. U. S. Congress, House of Representatives, House Document No. 463, 64th Congress, 1st Session, 1915.

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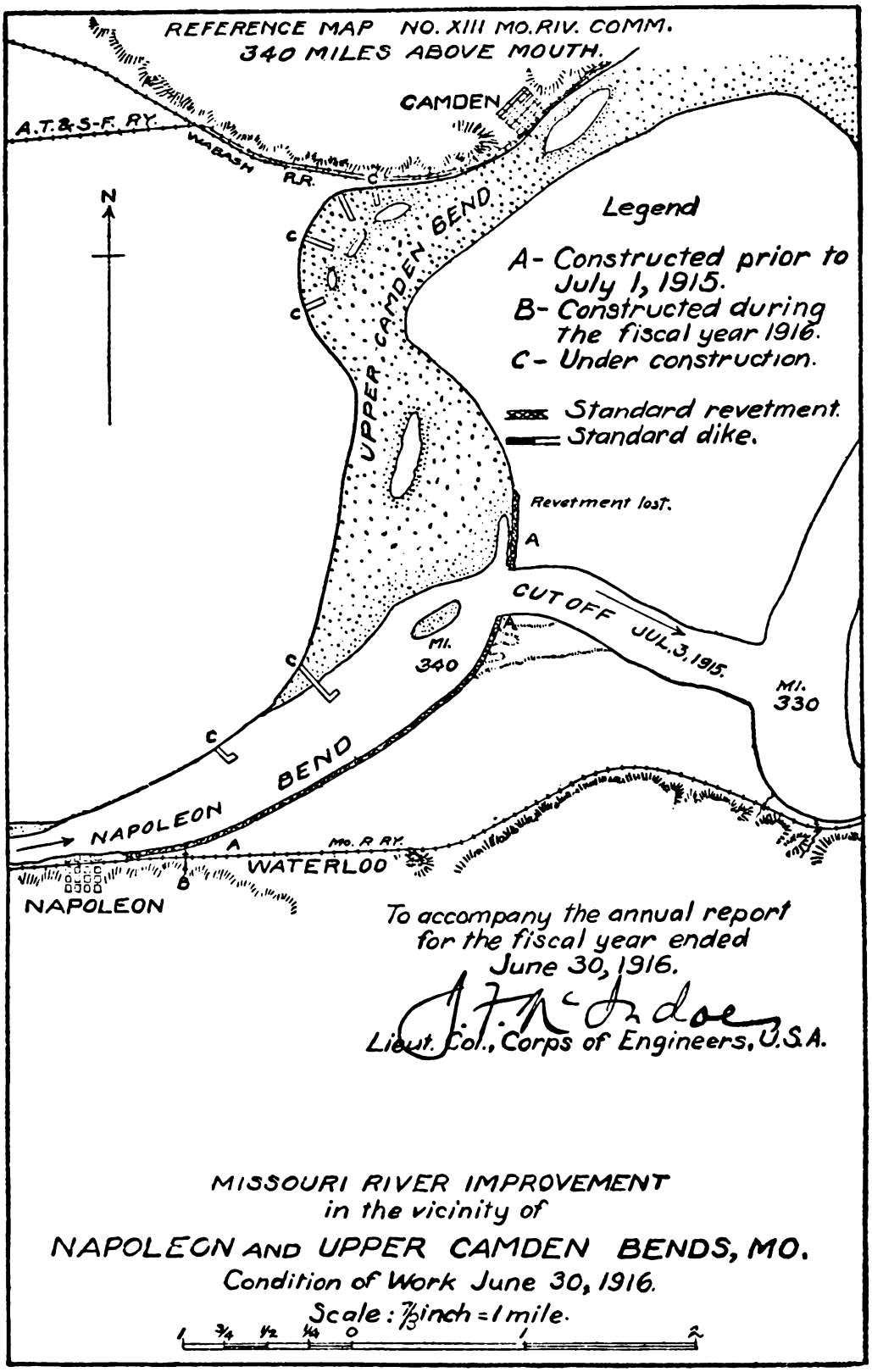

This map from the 1916 annual report *shows the cut-off made by high water near Camden, Missouri.*

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States actually entered the war in April, 1917, literally all military efforts were directed toward victory in Europe, leaving little time or money for domestic projects. After the war ended and America returned to "normalcy" there was a tendency to reduce government spending in general, depending on private enterprise to solve economic and transportation difficulties. Under these circumstances the degree of completion of the six-foot channel was rather remarkable. Indeed, on the tenth anniversary of the project the District Engineer's report stated: "On account of the lack of funds, the work of permanent improvement has been suspended. Maintenance and repair work was in progress from July 1 to December 17, 1921 but on account of the lack of funds work was not resumed until March, 1922."[12]

Even when funds had been available the river sometimes stopped new work and destroyed parts already done. Lt. Col. J. F. McIndoe, District Engineer during 1916 and '17, had to report that "... the year 1915 [was] remarkable for prolonged high-water stages. The river passed the allowable working stage for revetment (5 feet above standard low water) March 25, 1915, and remained above this stage to October 25, 1915." Eight distinct crests moved down the Missouri during the summer, followed by general high water until well into the autumn. Colonel McIndoe calculated that 2 percent of the completed improvements were destroyed. Some of the worst damage came when revetted banks were breached and cutoffs made near Napoleon and Arrow Rock, Missouri. The first one made a permanent change of channel, moving the river several miles from Camden by eliminating an eight-mile stretch with a two-mile cutoff. The other was more in the nature of a slough paralleling the main channel in Saline City Bend. McIndoe recommended constructing "a closing dike as soon as the stage of the river will permit." Even so, high water of this sort prohibited new work while increasing maintenance and repair costs on completed sections.[13]

During the 'teens and 'twenties Congress sometimes appropriated a single sum with the provision that the Secretary of War and the Chief of Engineers determine the use under previous legislation, while at other times it spelled out each project and the amount to be expended. In this latter case changes in existing projects were occasionally made. For instance in 1917 the upstream limit for the six-foot channel was changed from Kansas City to the upper end of Quindaro Bend, adding ten miles to the project. A few years later, in 1925, the width of navigable channels was set at 200 feet "with a reasonable additional width around bends." Since original legislation had called for an overall river width of 1200 feet, which usually included a 200-foot channel, this legislation did not involve much of a change. One other law that affected the whole Corps of Engineers required local interests to share in the cost of any improvement that conferred special benefit on a locality. For the lower Missouri River the Secretary of War ordered a 25 percent government and a 75 percent local contribution on any "special installation." This did not include the basic navigation project; thus the local expenditure of slightly under two million dollars did not compare to the almost forty million dollars spent on the overall project by the end of 1929. Whether the appropriation was large or small, the District pushed ahead, reporting in 1929 that the river from Quindaro Bend to the mouth was 55 percent regulated.

Although the District's major efforts were expended on the lower reach of the Missouri, its jurisdiction and responsibility included the whole river. The middle and upper sections were treated quite differently during the period 1912-1920. From Sioux City to Fort Benton the project simply called for work that helped existing navigation. Throughout the years neither the District nor the Congress believed that anything more than limited activity in the area was justified. On the Kansas City to Sioux City segment the situation was quite different. As the population and economy of the Missouri valley grew, it became obvious that extension of the six-foot channel would be beneficial to the region. In 1927 Congress authorized extension of the

12. **Annual Report,** 1922, p. 1273.
13. **Annual Report,** 1916, p. 2649.

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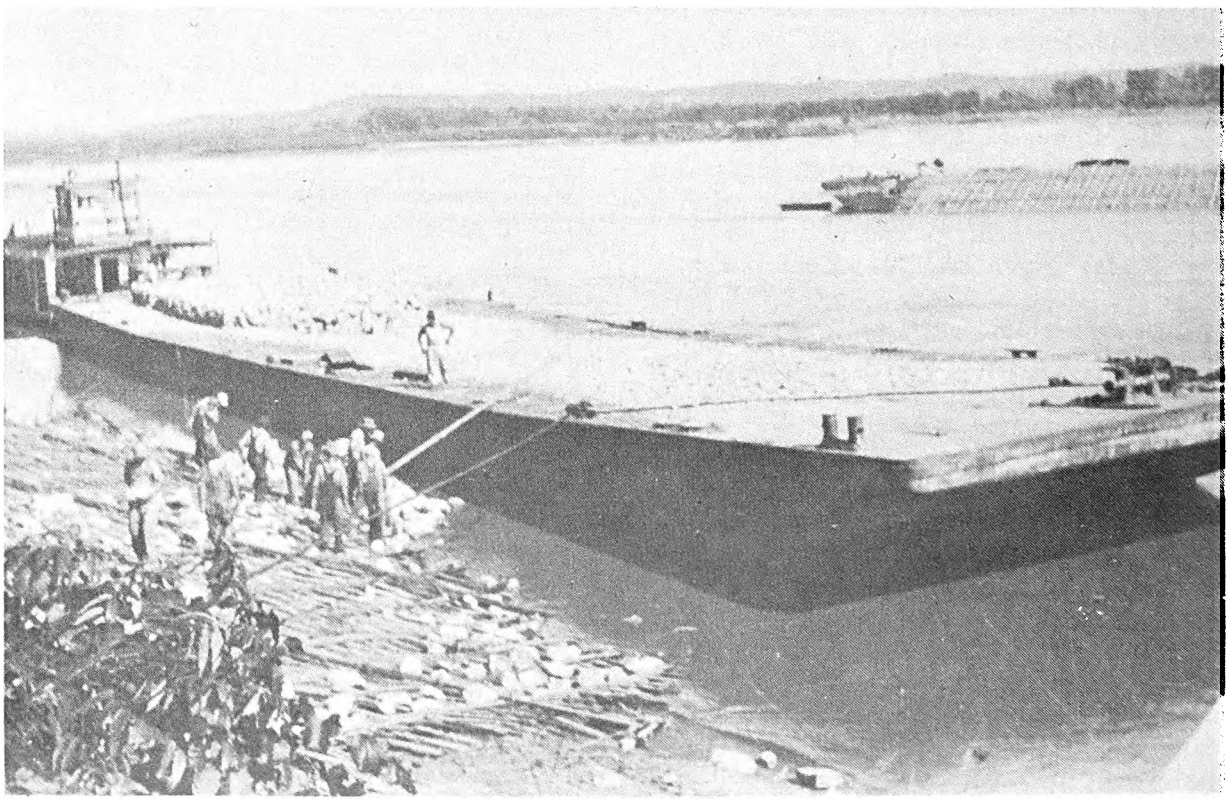
deeper channel from Kansas City to Sioux City, appropriating twelve million dollars to commence work. That the task would be formidable can be seen from the District Engineer's report: "There is not a dependable depth in excess of 3 feet over this section during the period of low water, nor of 3½ feet for any considerable length of time at any season." Now another massive project was about to begin, but thankfully 1927 also seemed to be the point at which Congress decided to be more generous with funds.[14]

Despite Maj. C. C. Gee's pessimistic view of the river north of Kansas City, there actually were a sizable number of isolated projects protecting cities and points of importance. As work progressed between the improved points the river would obtain a deep channel quickly. The first few years of the project seemed discouragingly slow; then as improved sections were joined the whole picture changed. By 1935, the District Engineer could report that the river from Kansas City to Rulo, Nebraska (about 130 river miles and the northern boundary of the revised District)

14. **Annual Report, 1927, p. 1106.**



Carrying out the 1912 project to provide a six-foot channel involved weaving, placing and holding mats in place. This view shows workers placing "one-man" stone on an already positioned mat. Another mat can be seen at the upper right.

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was 75 percent complete and that for the 25 miles up to Leavenworth, Kansas, the river was "practically stable." This progress was especially gratifying in light of efforts to increase barge traffic on the river.

The latter 1920's witnessed several dramatic changes with regard to Corps of Engineers' activities. As already noted, appropriations were increased substantially for projects already authorized. In addition Congress decided that several surveys on the future uses of navigable streams had become necessary. In 1925 the River and Harbor bill called for a report estimating the cost of power development where it seemed feasible. The Corps of Engineers' response to this was published in House Document 308, 69th Congress, 1st Session. Although a brief statement, it listed the rivers worthy of investigation and pointed out the close relationship between power production, flood control, irrigation, and navigation. Thus, when studies were made in the years following under the guidelines of "308" (as the document quickly became labeled) all aspects of river use were included. Indeed, power development soon had to share the limelight with flood control and navigation as they increased in importance. A year after "308" was completed Congress added another dimension to the work of the Kansas City District when it included in the River and Harbor bill of 1927 a request for preliminary examination of the possibility of deepening the channel from Kansas City to the mouth of the river from six to nine feet. Since the six-foot channel had not yet been completed estimation of cost and advantage to shipping would be extremely difficult to obtain. Nevertheless the overall change in the level of activities could not help but create enthusiasm in the District.

While the massive job of implementing the "308" report in other river valleys got under way, the Kansas City District started the more limited, but certainly not less complex, task of determining whether a nine-foot channel should be recommended. During October, 1929, Maj. Gordon R. Young, District Engineer, presided over hearings called to obtain local opinion on the subject. Major Young described at the hearings that the Corps normally carried out an "economic survey" to determine how a river improvement would affect transportation. "In the present case," he noted, "it is rather more complicated. We are now working on a 6-foot channel below Kansas City. The channel is not completed, and practically no commercial freight moves on it. The amount, character, origin, and destination of the freight which will move on the 6-foot channel and the probable savings can, therefore, only be estimated." Under these circumstances the Major's task was "to estimate how much more freight will move and how much more savings will result from a possible channel '9 feet deep at low water' than from the 6-foot channel." The conclusion he drew was "In other words, I must make one estimate on top of another estimate."[15]

For four days the District Engineer discussed the proposal with interested parties. The prime mover of the nine-foot channel was the Missouri River Navigation Association, a regional organization representing business and community leaders. Support for the deepening was overwhelming. In its simplest terms the argument ran that since the Mississippi River already had a nine-foot channel the Missouri needed the same depth in order to be part of a Mississippi-Missouri navigation system. Six-foot barges carried only one-fourth as much grain as a nine-foot one, and the cost of transferring cargo at St. Louis for the trip south to New Orleans destroyed the economic advantage of water shipment. The same case was made for other products and destinations. Steel from Pittsburgh or soap from Cincinnati could arrive on fully loaded nine-foot barges, unloading right on the Kansas-Missouri border. Some indication of the interest of the Kansas City business community could be seen from the fact that J.C. Nichols, the area's most important real estate developer, represented the Navigation Association. In some cases, Nichols questioned other witnesses with the clear aim in mind of building a positive response to the nine-foot

15. "Transcript of Proceedings of Hearing on Proposed Nine Foot Channel on the Missouri River from Kansas City to the Mouth" (Typewritten, Anna M. Feltenstein, Reporter, Kansas City, Missouri, Corps of Engineers Library, October 8, 9, 10, 15, 1929), pp. 2-11.

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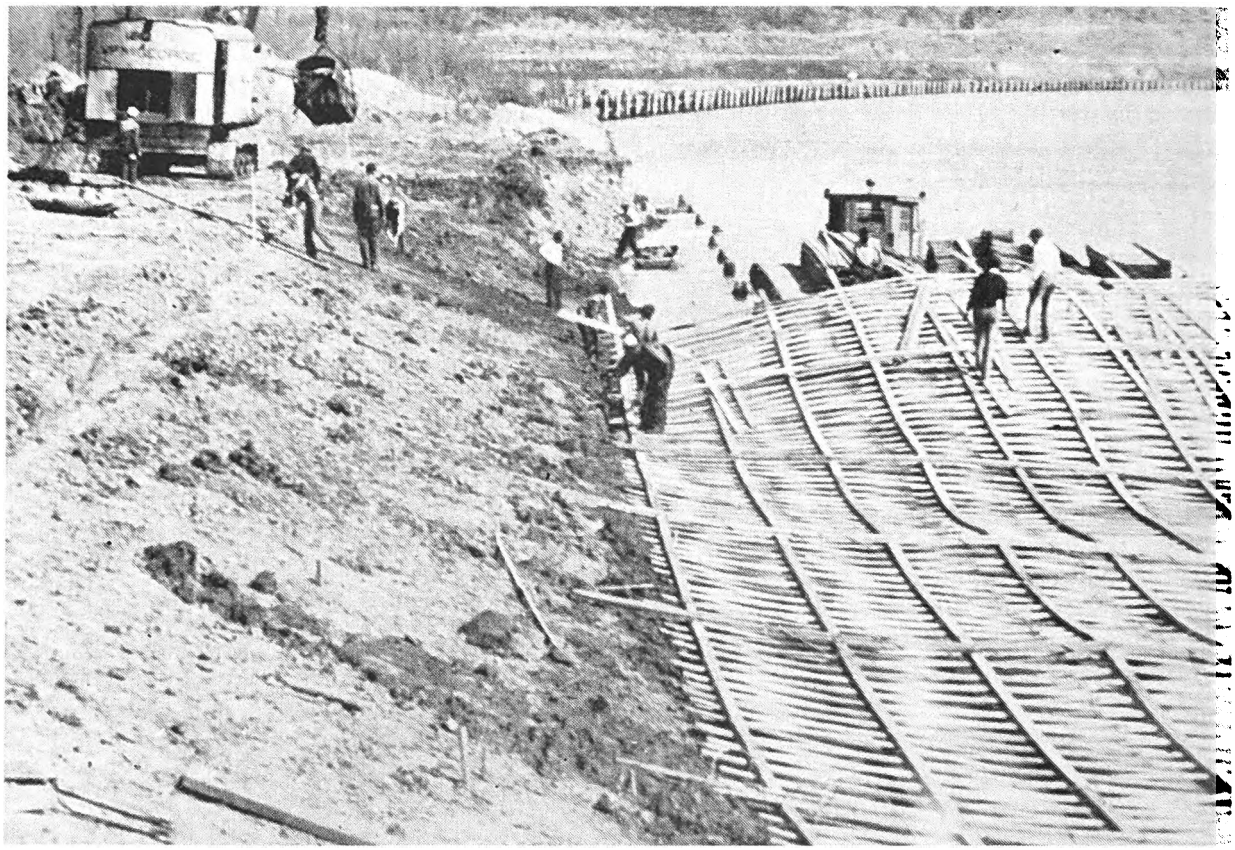

During the 1930's bank stabilization work continued. In this view, a lumber mat rather than a willow mat is being placed on the bank. The grading being done by the drag line in the upper left can be clearly seen. At the upper end of the mat, the bank is still quite steep, while in the foreground it has been smoothly graded.

channel. When the hearings ended some 650 pages of testimony had been recorded and the District Engineer had a good deal more information on which to base his report.

Major Young's final report, which went to Chief of Engineers on February 10, 1930, was comprehensive, outspoken and coldly logical. The Major evaluated the information obtained at the 1929 hearing, concluding that while some of the predicted river shipping on a nine-foot channel was vastly overstated, there was clear evidence that commerce would increase with greater depth. Again and again he noted the "conservative" nature of his conclusion; still, he predicted an increase of 3.3 million tons of cargo per year from a nine-foot channel over a six-foot one. Of more interest than the economic justification were his remarks on the river itself. He outlined six possible ways of reaching the additional depth, systematically discarding one after the other. Additional dredging he saw as requiring too many dredges while not assuring a lasting channel. A lateral canal or a series of high dams would be far too expensive or destructive of agricultural land to be considered. Low, movable dams on the order of those used in the upper Mississippi seemed unworkable because of silting. Increasing the flow had many advantages, yet until more was known about the shifting bottom of the river it could not be assured of success. Thus he left as the only possibility, by the process of elimination, "Additional Regulation."

On this subject, Major Young described the Missouri as few men have.

> The word 'regulation' calls up a picture of a coherent and clearly defined river, flowing in generally parallel filaments be-

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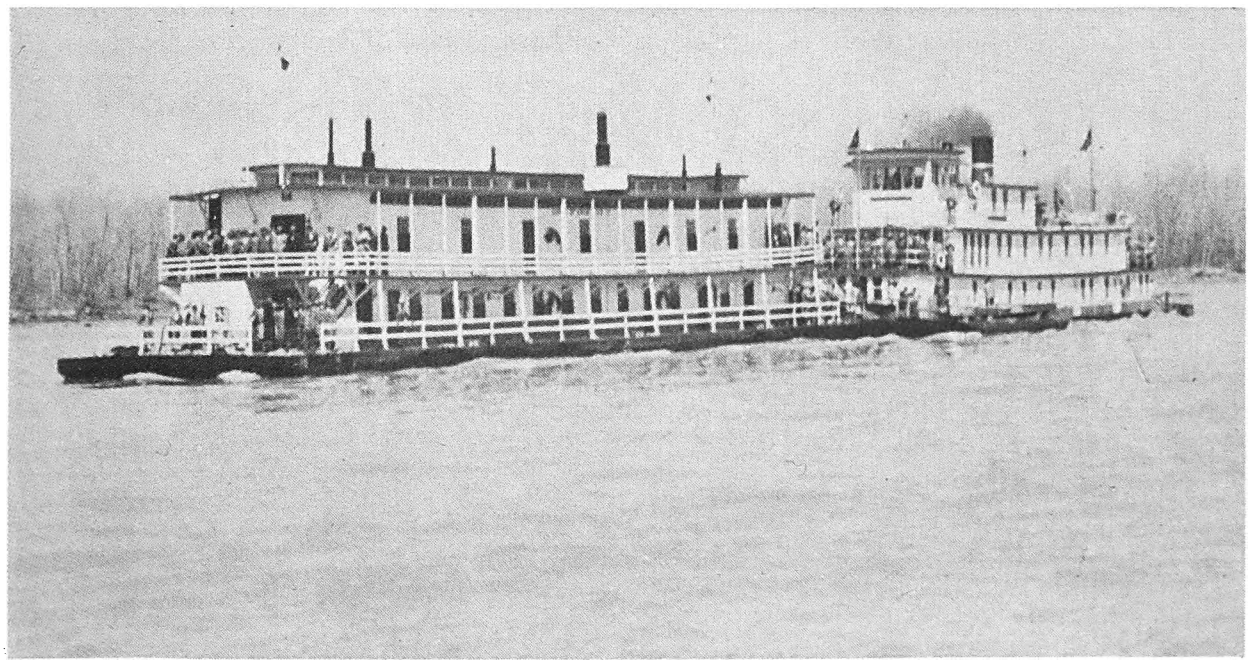
tween generally parallel banks, which is defective for navigation, in that it is somewhat too wide, or somewhat too tortuous, or needs to have its slope redistributed in a minor degree, or the like.

This is not a true picture of the Missouri in its original condition. Very little of it remains in that condition below Kansas City, but above Kansas City, and especially above St. Joseph, it may be seen in its native state. It is quite impossible here to state how wide the river is, or where the river is, or in fact to talk about a 'river' at all, in any coherent hydraulic sense. Where the stream should be perhaps a quarter of a mile wide, more or less, for the best navigation results, there are sections where the high banks are from two to three miles apart. At low stages there may be two, or three, or half a dozen threads of water between the high banks, each separated by shifting sandbars; as to whose hydraulic characteristics, about all that can be said is that they flow down hill.

Given such a situation, the first task is not so much to 'regulate' the river in the [European] Continental sense, as to obtain a river to regulate. The greater part of the area between high banks—the subflood-plain, if it may be so termed—must be barried *[sic]* to the wanderings of the river, restricting the latter to a narrow ribbon of water. The great burden of sediment in the Missouri makes this an easy (though expensive) task, since, if a stout permeable obstacle be interposed to the flow of the water, there is an immediate fill to approximately the height of the obstacle. The river being thus restricted to reasonable limits, all concave alluvial banks must be protected against its cutting. When this is done, we may not have the best river possible, but we will at least have a river, from which we can make reasonable and coherent hydraulic deductions.

Seldom had an engineer stated the basic problem so succinctly. Indeed, he even faced the most basic question about this perplexing river when he concluded "I cannot even say whether it is possible to obtain a '9-foot chan-



A quarter boat of the 1930's. It is clear that living conditions for workers had improved drastically since the nineteenth century.

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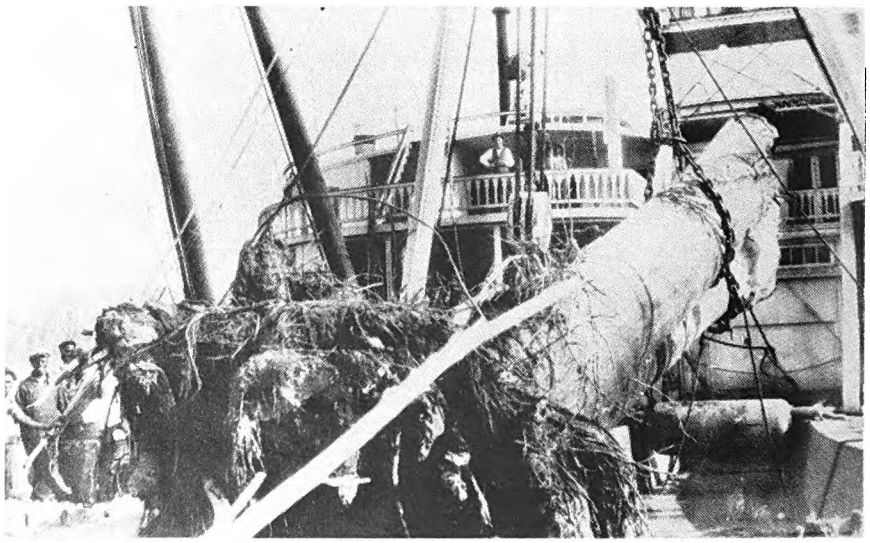
nel.' " Yet through it all Young had a kind of optimism which showed in the report's final words: "Whether such [the nine-foot channel] could in fact be done can only be shown in a survey. I therefore recommend that a survey be authorized." In literally all but actual hydraulic measurements Major Young had made the survey. Now it was up to his superiors and Congress to make a decision.[16]

Even while Major Young was completing his report on the nine-foot channel he was participating in the much larger survey outlined in the "308" document and further detailed by the River and Harbor Act of January 21, 1927 and the Flood Control Act of May 15, 1928. When presented on September 30, 1933, this report would be a massive summary detailing every aspect of the Missouri River basin.[17] Although navigation received full consideration, the report was remarkable for its discussion of flood control in the valley. Indeed, it could be said that this document brought these two topics, which would be married in the Pick-Sloan plan, to the beginning of their engagement. From this time on flood control and navigation would become inseparable.

The merger of these two activities came about from calculations that indicated the improbability of creating and maintaining a nine-foot channel with methods already used to reach a six-foot depth. Logically, if the amount of water already available could not be made to form a nine-foot channel, the only alternative was to increase the flow of water. Concern about the volume had developed during the drought years of the early 1930's. Studies had shown that the minimum flow at Kansas City necessary for a six-foot channel was 20,000 second-feet (cubic feet per second). A number of times during the 1931 season the discharge was less than this. On one day it registered only 10,700 second-feet—just one-half of the necessary flow. This crisis suggested that in dry years a six-foot depth would be impossible. Under the circum-

16. "Preliminary Report—Nine Foot Channel Missouri River" (Typewritten, Corps of Engineers Library, November 30, 1929), passim.

17. U. S. Congress, House of Representatives, House Document 238, 73rd Congress, 2nd Session, 1935.



Despite an improved channel, snagging operations were still necessary. This 1930 view shows how much equipment improved over the years.

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stances a nine-foot channel was not worth considering unless stored water could be called on.

In the flood control section four reservoirs were proposed: Arlington on the Gasconade, Chillicothe on the Grand, Topeka on the Kansas, and Fort Peck on the Missouri. For increased flow at Kansas City only Fort Peck and Topeka were considered since the other rivers joined downstream, but the conclusion was that a flow great enough for a nine-foot depth could be obtained even with irrigation and power activities. Of course, the dams would have to be built for this purpose rather than strictly for flood control. Chief of Engineers Maj. Gen. Lytle Brown concurred with the plan and recommended authorization of $145,000,000 for construction. If multi-purpose dams were approved by Congress, development of navigation on the Missouri River would take on a dramatic new dimension.

A few weeks after the report was submitted the Kansas City District would be limited to the lower section of the river and therefore have no direct involvement with the Fort Peck project. The new organization would involve the creation of the Missouri River Division headquartered at Kansas City, Missouri and two additional Districts—Omaha and Fort Peck. In fact, throughout the rest of the 1930's the District would push for completion of the six-foot channel both above and below Kansas City. From the very beginning the Kansas City District had a "substantially completed" stretch from Quindaro Bend to the mouth and a rapidly improving one north to Rulo. By mid-1935 the reach was considered 75 percent completed, while Kansas City to Leavenworth was pronounced "practically stable."

One factor that aided construction was the addition of public works money to regular river and harbor improvement funds. This was a relief measure to provide work for those who had lost their jobs during the Depression. A Public Works appropriation of $2.2 billion was made in fiscal year 1935, while Congress appropriated over $1.1 billion in Emergency Relief funds the next year. Since bank stabilization and revetment were "high labor" activities, relief money spent resulted in large numbers of men gaining employment during the working season.

The overriding reason for the long years of work and the millions of dollars spent on the Missouri River was to create a navigable stream. The early hope of a revival of commerce as the project went forward was not realized. There had been attempts; the Kansas

This stone revetment project carried on by the Public Works Administration displays how "high labor" tasks could be used to solve unemployment problems. The date was December 1933.

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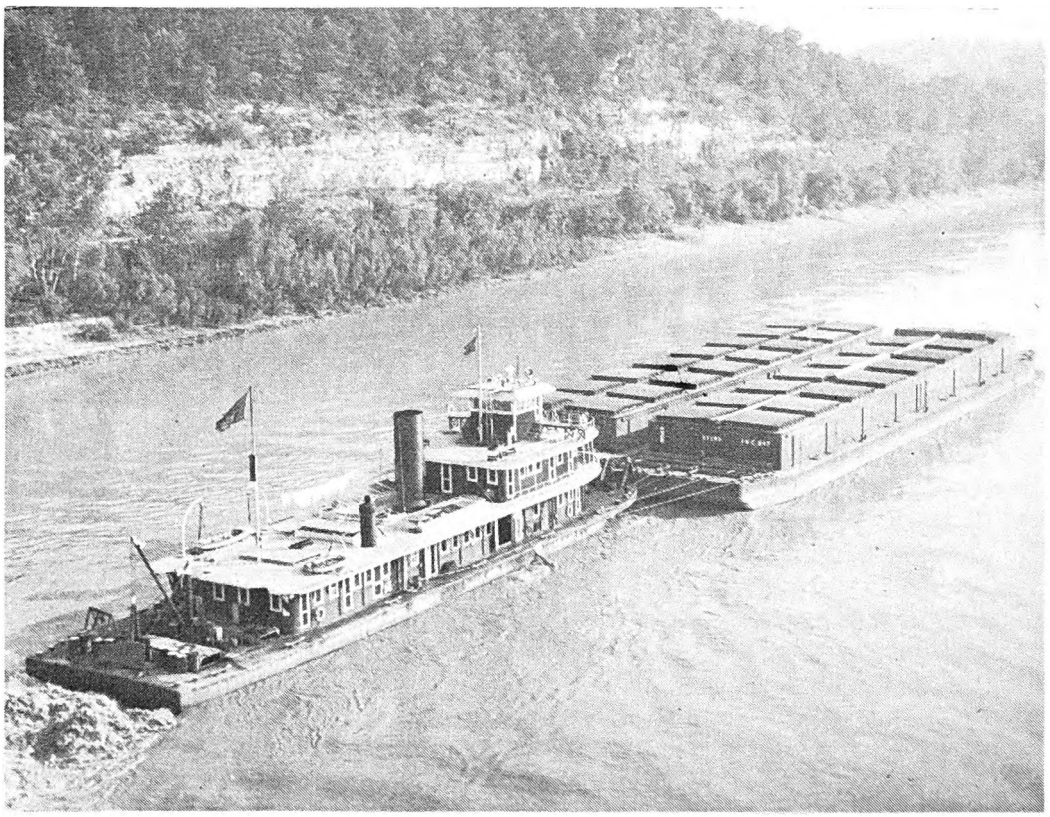

The Franklin D. Roosevelt *with a tow of barges during the mid 1930's. The federal barge line sought to develop navigation on the Missouri River as the project assured sufficient depth.*

City and Missouri River Packet Company started operations in 1890 and lasted for 4 years, while the Kansas City Transportation and Steamship Company struggled briefly during the business depression of 1907-08. Local leaders formed the Kansas City Missouri River Navigation Company early in 1912, starting business with three towboats and five barges, two of which were 200 feet long. Its progress was slow, although business was good enough to keep the firm going until World War I, when the government purchased all its equipment for use in other areas. During the 1920's and early '30's a few firms made use of the river, but no systematic navigation developed. Thus the Federal Government, deciding to underwrite the use as well as the development of the river, chartered the Federal Barge Line in 1935. The towboat **Franklin D. Roosevelt** entered the river early in June and docked at Kansas City on June 13, 1935. Soon it was joined by the **Tom Sawyer**, and before the end of the season they had moved 60,000 tons of freight. In the next season the figure doubled, leading to the decision to add a third towboat, the **Kansas City**, in 1938, and to institute three times a week service between Kansas City and St. Louis. The need to transfer cargoes in St. Louis from six-foot barges to nine-foot ones hindered development. The outbreak of war two years later led to reassignment of the boats and to almost total cessation of barge traffic. Nevertheless it was clear that commerce could return to the Missouri even with a six-foot channel.[18]

Prior to wartime changes the Missouri River Division reproposed a nine-foot channel from

18. **Kansas City Times, June 14, 1935.**

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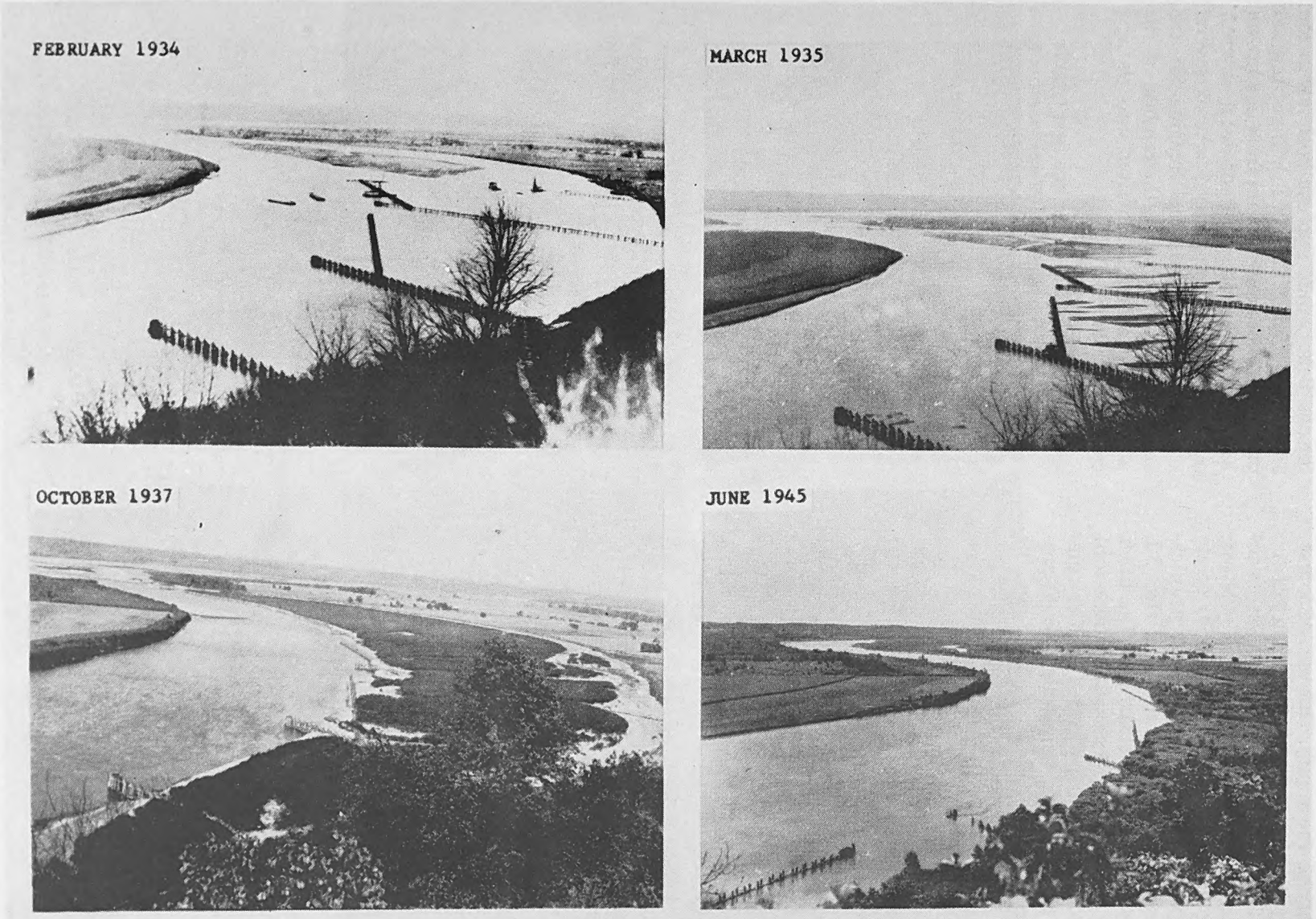

Corps of Engineers is "pegging" Missouri River at Charleston Bend, 26 miles upstream from St. Joseph, Mo. Note how piling collects silt behind the barriers, and how vegetation gradually covers deposits, thus holding the way river in its channel. This "pegging" by the Corps of Engineers will make the Missouri navigable for 760 miles.

In a publicity release, the Corps showed how dikes would lead to silt collection which in turn developed the river into a defined flowing channel.

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Sioux City to the mouth. This was, of course, a project that involved far more than just the Kansas City District; however, it was calculated that new work from Rulo to the Mississippi would cost over $16 million to create the deeper channel. The economic justification presented in this report (dated Dec. 30, 1935) was based on the fact that the other rivers in the Mississippi basin all had nine-foot channels. The feasibility rested on the completion of Fort Peck Dam which would provide the additional flow to maintain the proper depth. In a review the Board of Engineers for Rivers and Harbors supported the project, accepting the Division's basic proposal and agreeing with the economic advantages. While national security matters would preclude Congressional approval, one point in the overall plan—"cut-offs to eliminate long bends"—would receive some implementation before the war.

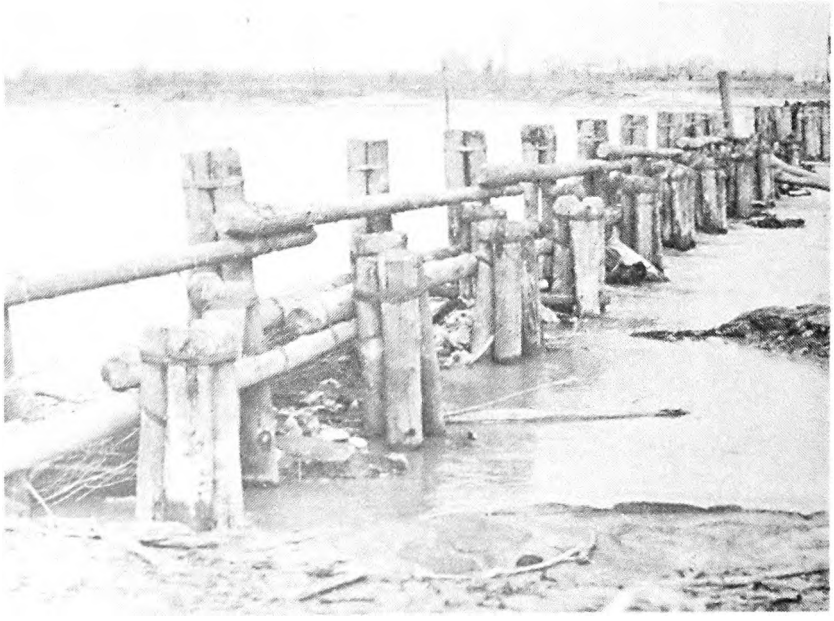
One of the most helpful cut-offs was made at Big Blue Bend during the early 1940's. Long a treacherous ninety degree turn with unpredictable currents, Big Blue Bend not only posed a danger for shipping, but made bank stabilization and flow control difficult as well. A long gentle curve from Randolph to Sissons Bend would improve both navigation and water level. Since construction occurred only eight miles downstream from downtown Kansas City a good deal of local interest developed. The **Kansas City Star** took several aerial photographs of the dredging for the new channel and covered the removal of the plug (which directed the river into its new course) in great detail.

Twenty minutes after the first trickle, caused by a suction device removing earth and sand from the 'plug,' the river had widened the gap to fifty feet, and the diverted current was getting unruly.

TWO-INCH ROPE SNAPS

Two anchor lines, one on each side of the canal, held a barge with its 10-inch iron suction pipe up to the plug. The river, roaring through the gap, surged against the barge and the anchor ropes tightened like banjo strings. Suddenly one of the 2-inch ropes broke. The huge barge twisted in the current, held only by one rope. The 10-inch suction pipe was bent like a soda straw. A row of four steel pontoons holding the suction pipe were jumbled between the barge and the

A close-up of a pile dike used to "shape" the river during the 1930's.



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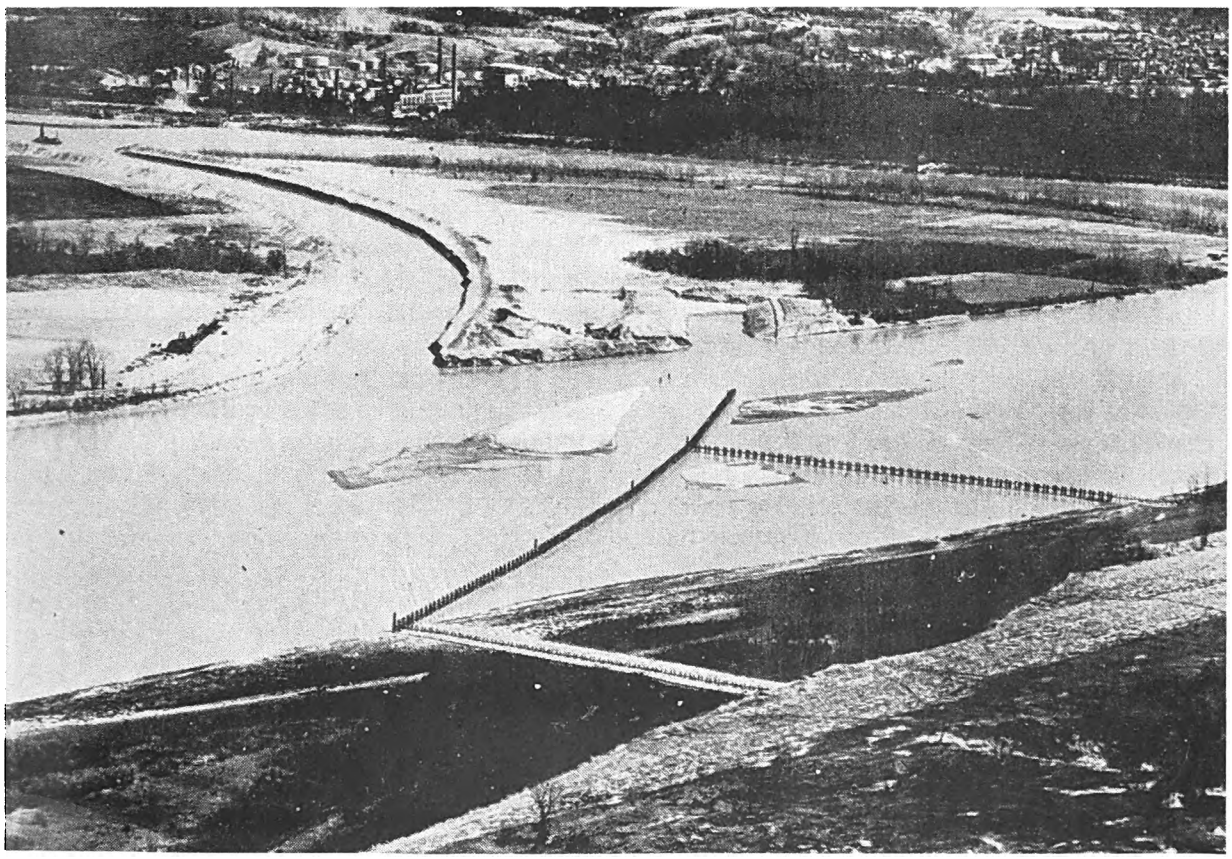

An aerial view of the Big Blue cut-off shortly after the plug had been removed. Soon, additional piling would close the old bend altogether and the river would scour the full width desired.

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bank. One pontoon and a row boat broke away.

A small tow boat used to push the barge into the plug was sent to chase the row boat and pontoon, and captured them several hundred yards downstream.

ADVICE FROM THE BANK

While the river was playing with the barge, more than 100 spectators, many of the engineers, watched with professional calm while the barge operator anchored his craft again. Some commented wryly on the way they would handle the barge in similar circumstances.

Among the spectators were Col. C. L. Sturdevant, division engineer, and his assistant, Capt. J. C. Arrowsmith, who arrived in the river launch Gasconade. Others present were Capt. A. M. Neilson, district engineer, and his two assistants, Capt. D. T. Johnson and Capt. David Heiman. George T. Miller, secretary of the Missouri River Navigation Association . . . was in the party, along with about twenty other engineers from the Kansas City office.

> The new channel will eliminate a 90-degree angle at the Big Blue Bend which has been a nightmare to skippers since the beginning of navigation on the Missouri. The new channel will provide a wide, gentle bend.[19]

During the next two years additional bends were smoothed with cut-offs while bank stabilization also continued at a fairly rapid pace. A large project covering a six-mile stretch along the Kansas City, Kansas, waterfront went on during 1940. This included a standard revetment using one-by-four lumber instead of willow branches for mats. The Star gave detailed coverage in words and pictures, but misled its readers somewhat by a caption that reported "these workmen are weaving 'lumber mats' to be lowered to the bottom of the Missouri River near the Fairfax district in an effort to provide a 'stable river bottom.' " As any engineer could have told the writer, the mats were placed on the bank to stop erosion, not entirely on the river "bottom." At any rate, the public remained well informed about this aspect of the District's work.[20]

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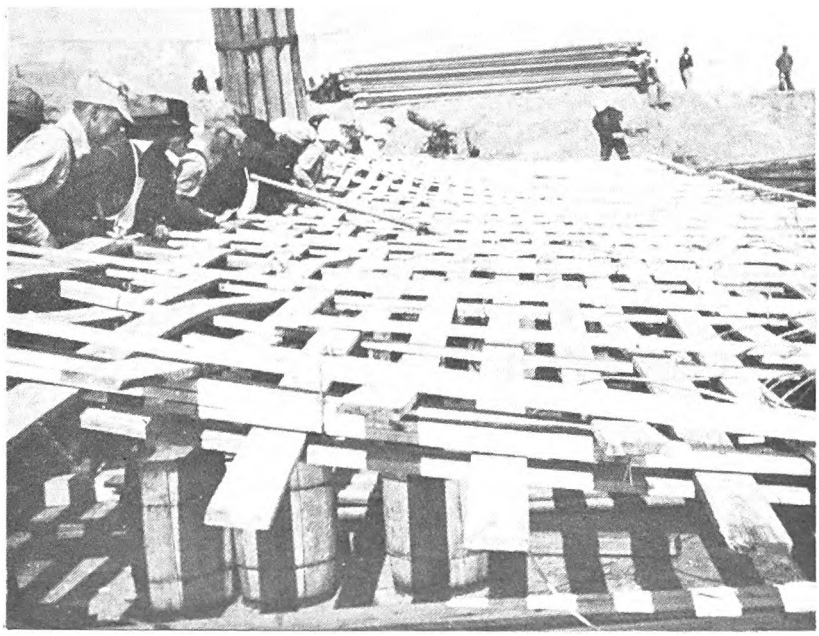
19. **Kansas City Times,** April 11, 1940.
20. **Kansas City Star,** April 15, 1940.



A close-up of men weaving a lumber mat at the Kansas City area Fairfax-Jersey Creek project in April of 1940.

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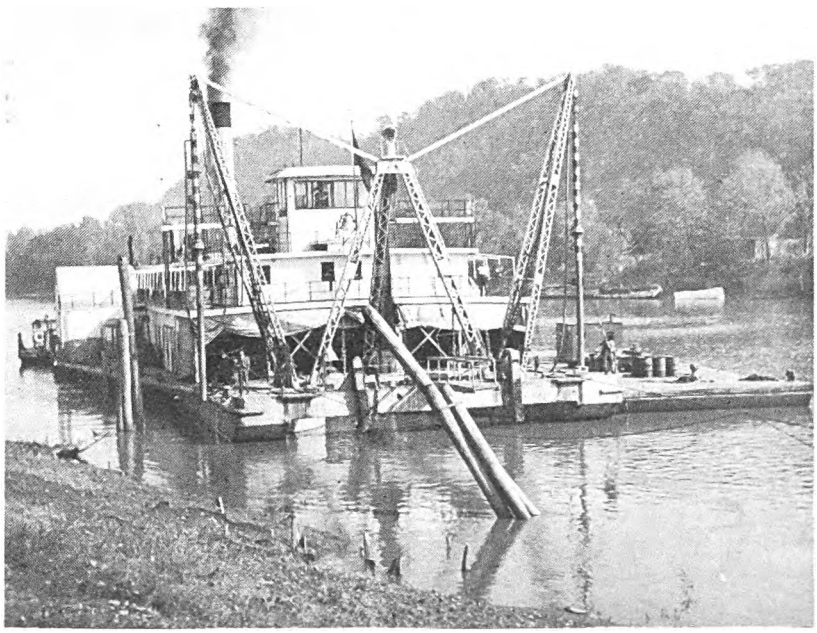
When war came in late 1941 the changes on the river were dramatic. Shipping declined tremendously, new work practically ceased, and maintainance received scant attention. Indeed, while the Corps pursued military construction many stretches of the river, especially those north of St. Joseph, started to return to an uncontrolled wild state. One unit of the Kansas City District found itself in just the opposite condition. The Gasconade Boatyard soon found itself in the business of building landing craft for the navy as well as boats for other districts that had no facilities of their own and no outside contractor able to take on the work. The life of the Corps of Engineers Boatyard had been long and active and its role had been indispensable to the mission of the Kansas City District.

It had its beginning some years before the District was created when the Missouri River Commission established a boatyard on November 1, 1892, at the junction of the Missouri and Gasconade Rivers. In its early days it was a modest operation containing a two-story living quarters building, an engine and boiler room, a steam power saw and planing room, and a few other structures. Its location on the Missouri River provided an ideal spot for a marine way and a spur line from the Missouri Pacific Railroad allowed easy access for heavy supplies. One of the first boats constructed was the "Office Boat" **Margaret.** As soon as it was readied the supervisory staff moved on board, closing the temporary office at Hermann, Missouri. After completing revetment along the Missouri bank the young installation appeared ready to move forward.

A major setback occurred in April, 1894, when a cook fell ill with smallpox and died. Some 75 men left the yard for fear of the disease, while even more left rather than take the vaccination. No epidemic occurred and work returned to normal in a few weeks. The success of Gasconade can be seen by its absorption of other boatyards. In 1897 the Ewings Landing yard closed and in 1899 Osage Point boatyard and Bonnets Mill supply depot followed suit. All the functions of these units were taken over by Gasconade. However, the declining use of the river in the 1890's placed even Gasconade in a precarious position. The District Engineers during the first decade of the twentieth century were able to report the doings at the boatyard in one or two sentences. Luckily the need for a good winter harbor as well as confidence in the future of river commerce led to the purchase in 1910 of the boatyard land which up to that time had been leased. The area, larger than the original yard, included a stretch of the Gasconade River bank where a mooring could be developed safe from the ice gorges of



The dredge Clark deepened the harbor at Gasconade in 1936 in order to provide additional space for the District's floating plant.

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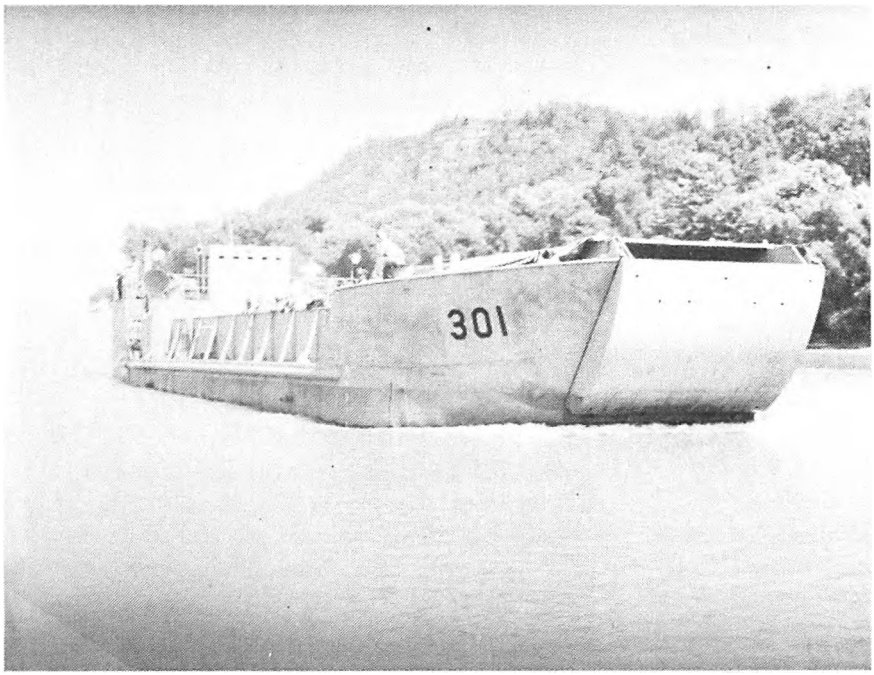
One of the Navy landing craft constructed by the Boatyard during World War II.



the Missouri. In the years that followed activity increased with the expansion of interest in navigation.

For the next twenty years, the yard carried out its assigned duties under more and more crowded conditions. Finally, in 1929 the government purchased additional land that allowed for needed expansion. Larger vessels now could be removed from the water and repaired. Also the harbor could be expanded and storage space increased.

On a number of occasions, Boatyard personnel had to assist in areas outside their district. Several skilled shop carpenters and mechanics were sent to help establish a boatyard at Fort Peck in late 1933, while four years later, much of the equipment was removed from winter harbor to be taken by local staff to aid in the Ohio River flood emergency. Moving onto the ice clogged Missouri River in February was dangerous in itself, yet the crews carried out their rescue without mishap. Of course, the most dramatic example of non-District work involved the building of landing craft during World War II. From July to November, 1942 the Boatyard worked on thirty-seven Navy craft, performing everything from small services to almost complete assembly. Later in the war, some dredge tenders were built for the Philadelphia District to aid in the war emergency. Gasconade's reputation spread far and wide, as was proven by the fact that many other districts asked for construction estimates in order to obtain cheaper and better bids during the war period.

In the postwar years, the yard continued to perform for the District and the Corps as a whole. During 1949, a total of 153 pieces of equipment were repaired with a budget of slightly over $580,000. In the same year, a number of special projects were carried out including testing improved hydraulic steering gear, building experimental "tainter" gates for a Little Rock District dam project and constructing a model spillway for the Fort Peck Dam. By the 1960's ecological and pollution matters also touched the Boatyard and sewage disposal facilities were designed for several of the District's craft.

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An aerial view of Gasconade showing the main buildings. The picture was taken during the flood of April 1952.

Despite the long record of achievement, the Boatyard's useful life finally ran out. Two factors sealed its fate: the virtual completion of the navigation project on the Missouri and the increased use of contract labor for navigation work. By 1966 the work force had declined to thirty-five people in a plant valued at over $480,000. Under these circumstances it was inevitable that cost studies would reflect poorly on Gasconade. Thus in late 1971 the District Engineer recommended reduction of the facility to a harbor. Needless to say, local residents voiced a great deal of opposition and much correspondence passed between the Missouri Congressional delegation and the Kansas City District. In the end the closing was impossible to avoid. During the summer of 1972 the U. S. Engineers' Boatyard became a part of Missouri River history, leaving only a winter harboring place at the mouth of the Gasconade.

In the war years when the boatyard was busy building landing craft for the Navy or equipment for other districts, work on the river improvements stood still. Given the emergency, no funds were made available for repairs on bank stabilization projects. However, by 1944 Congress had brought together various plans involving navigation, flood control, irrigation, and other aspects of water management. Commonly known as the Pick-Sloan plan, it became law in early 1945. It accepted the 1939 report calling for a nine-foot channel and authorized its construction from Kansas City to the mouth. This legislation fulfilled the long time dreams of Missouri River users, setting into motion the last stage of navigation development.

The problems facing the Kansas City District seemed overwhelming. The six-foot channel had not been totally completed before the war, a good deal of deterioration had taken place in the early 1940's, a cycle of floods, high water and strong ice floes threatened to do more damage, and flood control aspects of the Pick-Sloan would draw heavily on its manpower. Given the circumstances, the District launched a massive maintenance program. For

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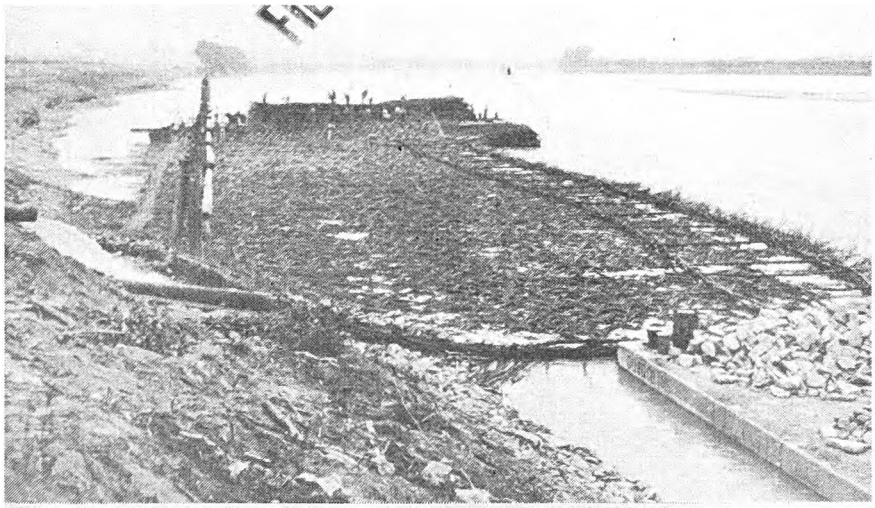
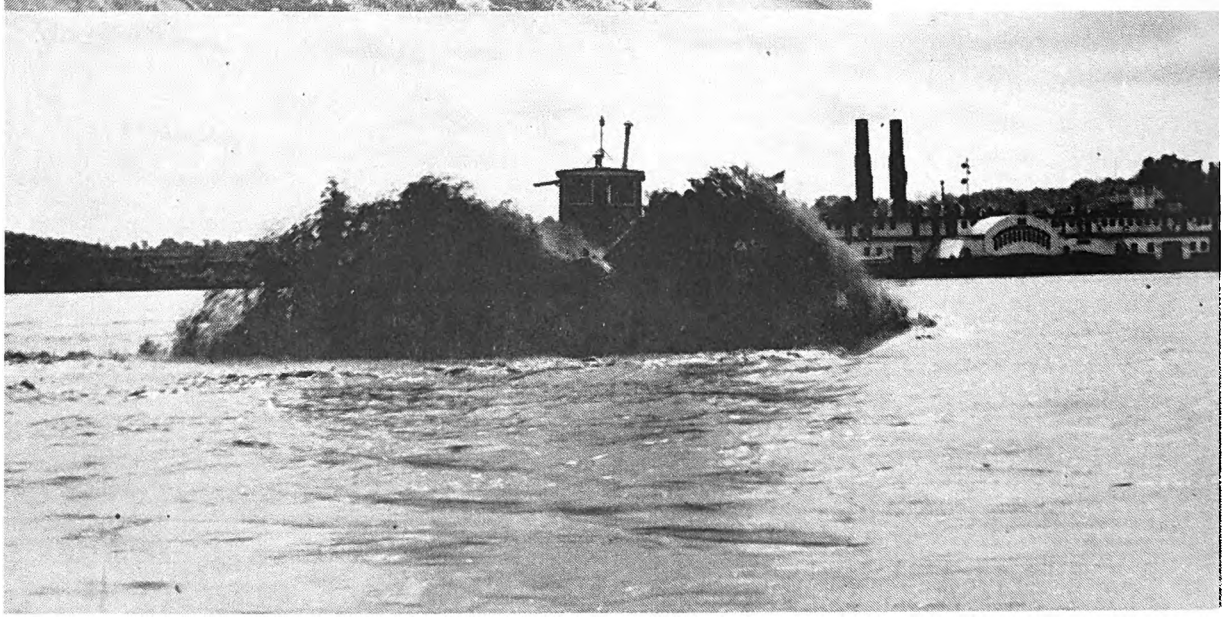


During the summer of 1946, work on bank stabilization increased as the District sought to achieve the nine-foot channel.

A view of the discharge from the Clark *as it deepened the channel during the spring of 1949.*



the fiscal year 1946, over $2.5 million was expended on repairing and dredging, a figure about twice as high as for new work. The large amount of dredging had become necessary to remove reefs formed by bed movement and sediment deposits that occurred as channel action declined during the war. The District Engineer could report in June 1946 that from Kansas City to the mouth a six-foot channel was "in general, available throughout the navigation season." In 1941, this would have been good news; now, however, it was three feet less than Congress had authorized.[21]

In 1947, the District was able to undertake slightly more new than maintenance work ($1.83 to $1.65 million) as the older structures were brought up to standard. However, the flood of June, 1947, stopped all progress and damaged numerous levees. Luckily the Engineer was able to report that the river did not change its course even though several dikes were severely damaged. During the early postwar years river projects did not change drastically, yet more emphasis was placed on "training" the stream into a narrower, more gently winding, self-scouring river. This meant frequent bank adjustments to create "alignments" which would produce the desired

21. **Annual Report, 1946, p. 1473.**

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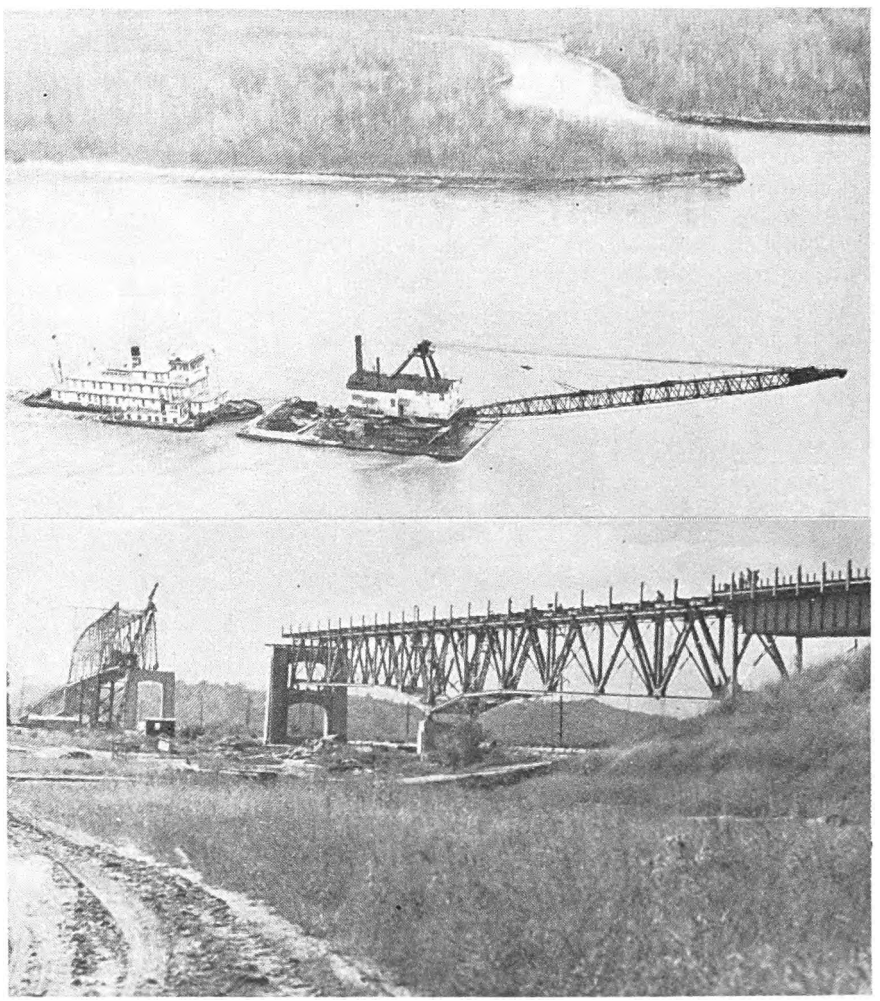
results. A major change in bank protection took place when "tow trench revetment" started to replace the willow or lumber mats of the earlier era. Mats had worked rather well, but they required large numbers of skilled "weavers" as well as specially built barges. Also under-cutting could avoid detection until a whole section of mat collapsed. The tow trench revetment technique depended to a greater extent on mechanical equipment and was more "self-healing." A drag-line—a large power grader with a bucket mounted on a barge—would dig a seven-foot deep ditch or trench along the low water line, with a bottom width of fourteen feet. This was then filled with the rock which was then tapered up the bank at a one-foot thickness. The river would quickly scour the earth on the riverward side of the trench, forming a new and well-protected bank. If under-cutting occurred there were enough stones in the trench to fall into the gap and thus restore the revetment. The new technique saved both time and money, but it also led to the disappearance of a unique talent—willow mat weaving.

Elimination of "oxbow" curves also improved both flow and navigation. A major cut-off constructed in this period eliminated the eight mile long Liberty Bend a few miles downstream from Kansas City. A study had been authorized in 1939 and a preliminary report presented in 1940, but no action was taken until after the war. Much of the justification for the cut-off was based on flood control; however, elimination of the long bend would also aid navigation.



The giant drag line that dug the tow trench was moved from one location to another by towboat. In this view, it is under tow by the District's inspection boat, the Sergeant Floyd.

Constructing the Liberty Bend Cut-off Bridge over dry land before the new channel was dug.

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After the long wartime interruption the Liberty Bend cut-off construction began in April, 1947. It involved two distinct projects: first, an 1800-foot highway bridge was constructed over the location of a new channel which was then dug by a local contractor; second, the Corps of Engineers made a shorter cut downstream at the Blue Mills Bend to tie into the larger one. The result was that a soft sweep of river replaced the sharp "S" curve that made navigation difficult as well as backing up the river during periods of high water.

The opening of the cut-off on April 16, 1949, became a major news story. Newsreel cameras ground away on both shores and aboard boats while planes flew overhead to witness and record the event in still photographs. Even the New York Times provided coverage.

The Missouri River was shortened by 4.7 miles today.

A tremendous blast of 750 pounds of dynamite blew out an earthen plug to allow the waters of the flood-swollen Big Muddy to flow into a man-made channel across the neck of Liberty Bend. Middle Western flood-control leaders attended the ceremonies.

Engineers said that by converting the seven-mile-long S curve into a gentle one the cut-off will speed the sluggish flow of the stream and reduce Kansas City flood levels by at least a foot.

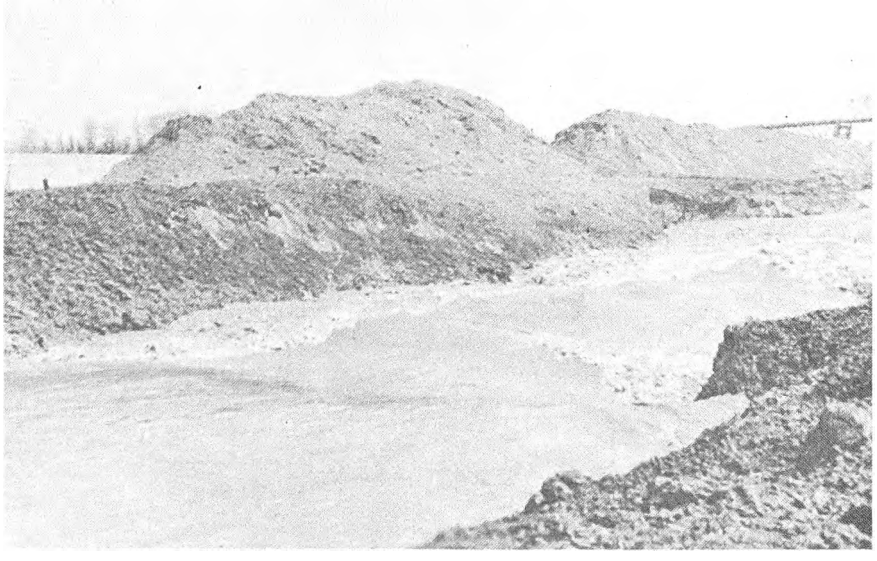
The river roared into its new channel a few seconds after Roy Roberts, president of the Kansas City Star Company, rammed home the plunger on a blasting box which detonated the explosives in the plug.

As he grasped the handle of the plunger Mr. Roberts said:

'Let the wide Missouri flow through a new channel.'

It was the climax of a ceremony, attended by some 2,500 spectators, many of whom had taken vantage points on the new 1,800-foot highway bridge built on dry land before the channel was dug.

Mr. Roberts in his speech stressed the value of the cut-off to Kansas City, Mo., and Kansas City, Kan., through the



This was the scene shortly after Roy Roberts detonated th charge that blew up the plug in the Liberty Bend Cut-off. Sadly, the river fell and additional work was necessary to obtain the new channel.

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The Clark *pumping water into the Liberty Bend Cut-off in an attempt to increase scouring action.*

reduction of flood levels. Col. Paul D. Berrigan, Kansas City district engineer, pointed out the $3,000,000 project is only part of the giant master plan for flood control in the Missouri River basin.

Other speakers were Col. Louis W. Prentiss, of Omaha, acting Missouri Division Engineer, and Mayor William E. Kemp of Kansas City.

The channel is about 10 feet wide and 15 feet deep, with levees on each side. Engineers said they expected the river would scour out the channel to about 1,000 feet in width.

Liberty Bend cut-off is about ten miles northeast of Kansas City.

Colonel Berrigan in his speech also pointed out the elimination of the bend would remove two of the most difficult bends in the river from a navigational standpoint.[22]

In one way the celebration was anticlimactic. The river unexpectedly fell so the scouring failed to take place and soon an "Island of Tough Gumbo" reduced the flow into the new channel to a trickle. Additional dredging took place to remove the bar along with the unusual procedure of pumping water into the new channel through the dredge pipe normally used to pull silt from the river bottom. It was hoped that this additional flow would increase the scouring in the cut-off, thus diverting more of the river to the new channel. Finally, as pilings closed the old channel, the new route widened and deepened, allowing traffic to enter in early June. Ingenious man and the June rise ultimately turned the new channel into a reality.[23]

Progress on the nine-foot channel project in the years after 1947 was steady but difficult. Training the river into a narrow enough path to maintain the desired depth was no easy task. By June of 1945, the District Engineer could report that from Kansas City to the mouth the project was 85 percent completed. On the other hand, he had to note the great damage done by the flood of June 1947. This kind of problem would continue to harrass the District over the ensuing years as high water would weaken dikes and undermine bank stabilization revetments. Often the year after a major flood would be used for a great

22. New York Times, April 17, 1949.

23. Kansas City Star, April 23, 1949.

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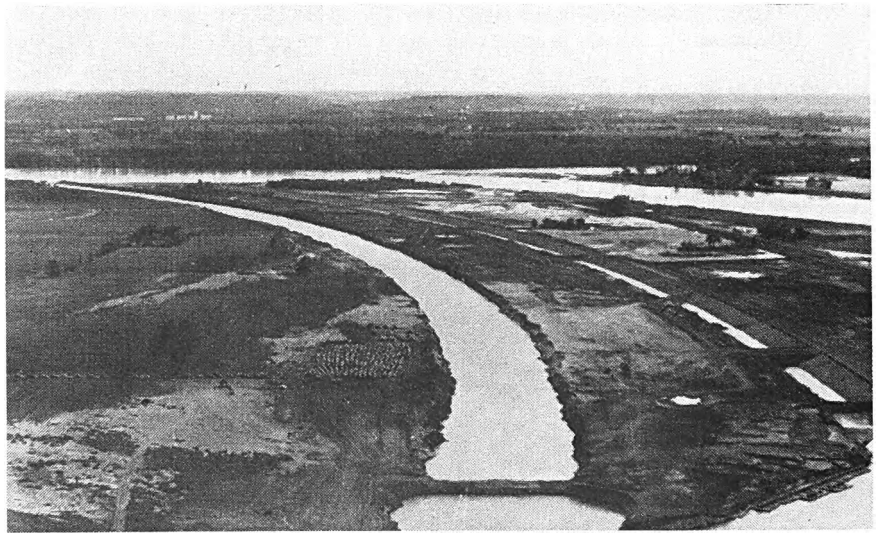

A view of the St. Joseph Cut-off showing the pilot canal, plug, and new bank revetment (on the right).

deal of repair and maintenance, thus cutting back on new work. The most encouraging aspect of the battle with floodwater was the success in keeping the Missouri in the predetermined channel. Although levees and flood walls were topped in several instances the river only once shifted its location to another part of the "meander belt." Thus by the 1950's the Corps of Engineers could claim that the "wild" river had been "tamed."

The single exception to holding the river in place occurred at St. Joseph during the 1952 flood. The Missouri followed a great oxbow curve flowing north and west of Rosecrans airport, then south and east to the city and finally back to the west downstream from St. Joseph. The high water cut a new channel between the airport and the city as well as another one directly south of the field which took the river away from downtown. Not only were local citizens separated from their airport by the river, they were also in danger of no longer having access to the Missouri for domestic water and sewage disposal. Under these circumstances, the Corps had to act quickly to devise plans that would assure the city of water supplies.

Local officials wanted the river returned to its pre-flood channel but the two cut-offs—especially the southern one where the river was cutting a deep and hard-flowing chute—would have made this extremely difficult and expensive. District personnel drafted a proposal that would keep the river between the city and the airport while assuring St. Joseph a waterfront. The plan envisioned a man-made cut-off slightly east of the northern flood-produced channel along with a closure structure where the southern cut-off left the main stem of the Missouri's old course. The new cut-off would pull the river away from the route it now wanted to take and keep it at St. Joseph. After serious consideration city officials agreed to support the Corps' recommendation.

Because of the danger of leaving St. Joseph "high and dry" the District did not follow the usual procedure of digging the "pilot canal" in late winter and then allowing the spring rise to scour the full new channel. Instead, the Engineers requested permission to begin immediately. Using a novel approach, Congress in July, 1952, authorized construction out of maintenance funds rather than new construction money. This eliminated the need for an appropriation bill, thus speeding up the work.

Over the next two months, the Kansas City District rushed the project to completion. A "pilot canal" was dug to create a new cut-off, while bank revetment work proceeded slightly to the west. At the same time, pilings were driven in the flood-produced channel so that

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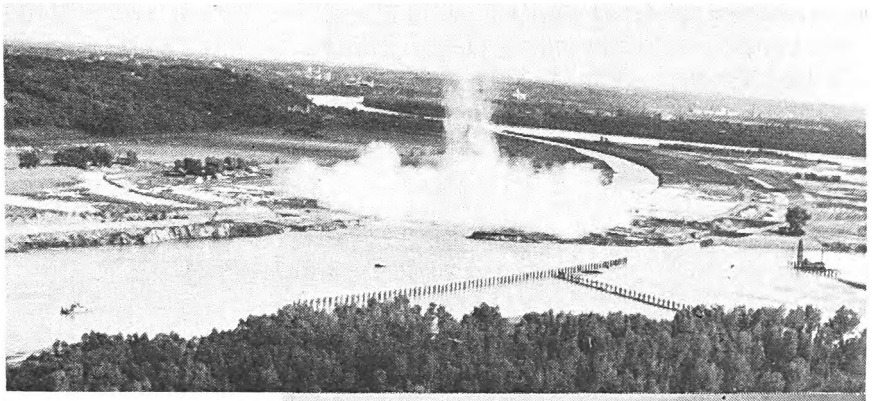
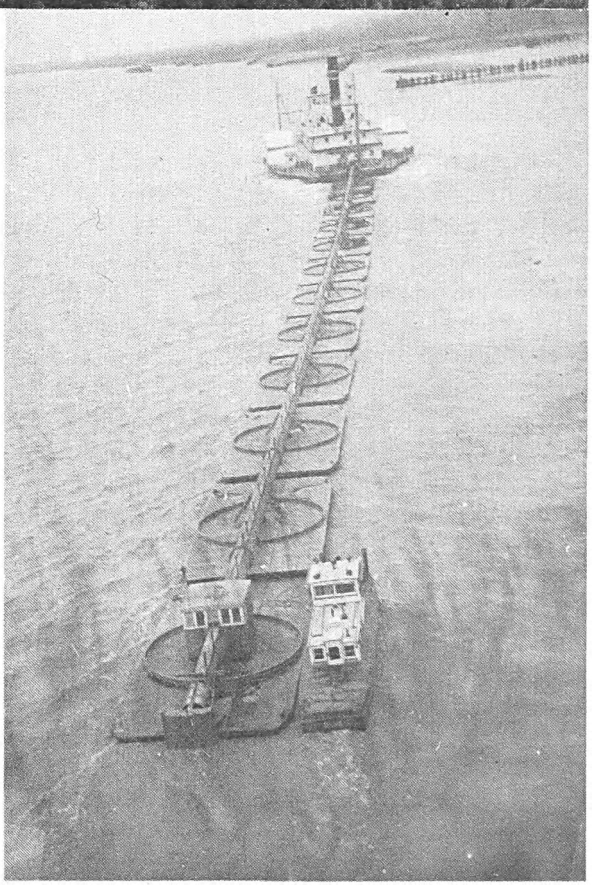


Detonation of the plug in the St. Joseph cut-off. The speed with which the job was completed assured St. Joseph of a badly needed waterfront.

it could be closed quickly after the "plug" on the canal was blown up. Downstream at the southern cut-off a barge was moved into position to drive pilings that would close the unwanted chute. The river flow stretched the barge's anchoring cables almost to the breaking point while the current nearly snapped the piles in two. By early October all was in readiness. A brief dedication ceremony preceded the detonation of the "pilot canal" plug and the Missouri slowly moved into its new channel.

The major danger from opening a new channel late in the year was that the river's flow would not be great enough to scour the desired width. Then ice could well clog up the narrow stretch—especially at the "mouth" of the pilot canal—and cause serious flooding upstream. Luckily, no serious jams occurred and only once during the winter did ice pile up at the cut-off. Although District personnel spent several tense hours, the jam broke up without any serious damage. The St. Joseph cut-off improved the river for both navigation and urban uses, but even more it showed how the Kansas City District could meet and overcome a difficult problem.

Even with the year-by-year progress that led to ever higher percentages of completion, the nine-foot channel was an elusive goal. In 1961 the Engineer stated that the overall project was 91 percent done, yet he could only report a navigation depth of seven to seven and one-half feet. This remained true even though there were upstream dams that could release enough water to keep the flow at Kansas City above 35,000 second-feet. Often natural high water would provide nine



The dredge Clark *underway with its discharge pipe trailing. The "gate" at the end of the pipe is used to move the rig in order to dump the silt where desired.*

feet or more, but as late as June, 1970, seven and one-half feet was still considered the usually available depth.

Specifically, the problem of gaining the project depth occurred at the foot or downstream end of bends where the channel crossed from one bend to another bend or one side of the river to the other. These cross-

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ings resulted in sharp changes in the speed of the current and often led to rapid settling of silt that formed reefs. As time passed, Corps personnel developed techniques to provide a better flow pattern over the crossings, thus reducing reef formation; however, they were limited in terms of how many dikes they could build because each additional dike raised the flood level. By the early 1970's the river generally had well over nine feet in most reaches, while a number of crossings stayed a foot or so less. With dredges available to remove silt when a bend or crossing went "bad," the river was kept near the project depth. Only time would tell if nine feet could be permanently assured.

Despite the slow progress toward a permanent nine-foot level, the work load of the District declined as the project approached completion. By 1966 much activity involved maintenance, and this was mostly done by contract. The District's river personnel had been reduced to about 100 people including survey, administrative, and inspection staff. The need for dredging had also dropped sharply because stabilization had made the river generally self-scouring. In addition, pile dikes that had been so important in earlier river training were being replaced by stone fill dikes of the sort that controlled the flow in the desired channel. These stone dikes required less maintenance since they were highly resistant to ice, debris, and flood damage. Constant inspections and repairs had to be maintained to keep the Missouri tame, yet by 1971 the river had become an important artery of commerce.

A quick comparison of traffic on the Kansas City to the mouth section of the river provided dramatic evidence of the progress made since the 1930's. Total commercial tonnage in 1935 stood at 463,628 in comparison to 4,696,479 in 1970. This represented a tenfold increase over the thirty-five years. Even more impressive is the breakdown of commodities in the latter year. Over one million tons of grain moved out along with 460,000 tons of fertilizer, 60,000 tons of metal products, and numerous other items. Sand and gravel still constituted the largest single product, reaching better than two and one quarter million tons during the year, and using twenty-six loading facilities built exclusively for this material. Yet this low value bulk commodity contributed to employment for towboat operators, deck hands and others connected with navigation. Indeed, a comparison of the nine loading facilities in operation in 1935 with the ninety functioning in 1971 tells the extent of the expansion of river commerce rather well.[24]

When the **Franklin D. Roosevelt** steamed into view on that June day in 1935 that witnessed the return of commercial navigation to the river, everyone was impressed with her size and bright coloring. (No doubt the green background and white trim was an attempt to identify with President Roosevelt's favorite colors.) Although the **FDR** was almost fifteen

The compact but powerful Fort Pierre, *of the Sioux City and New Orleans Barge Line, thrusts its way up the Missouri. The SC&NO is the successor to the Federal Barge Line which was sold to this private enterprise company during the 1950's.*

24. **Annual Report,** 1936, Pt. 1, pp. 983-84; Pt. 2, 793-41; **Waterborne Commerce of the United States,** Calendar Year 1970, Pt. 2, p. 9; **Annual Report,** 1971, Vol. II, pp. 20-27-28.

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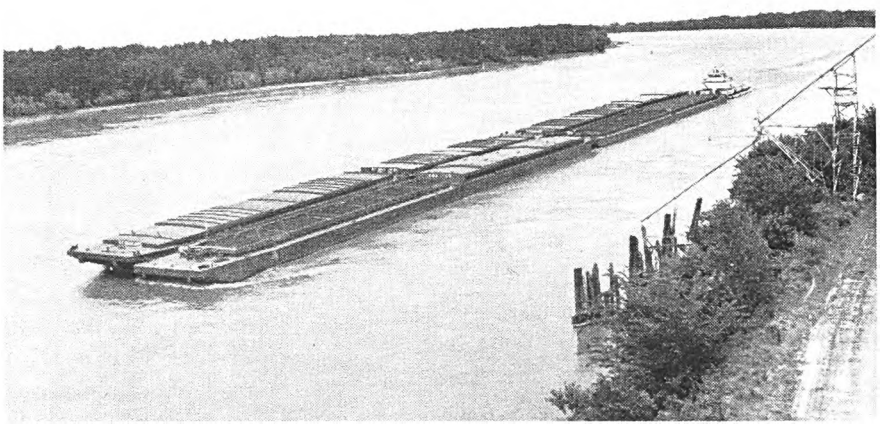

An eight-barge tow of the SC&NO. Obviously, great skill is needed to maneuver these huge trains around the tight bends.

feet longer than the average 135 feet of a 1970's towboat, it could not compare in engine power. In fact, given the increased velocity of the river as its banks have been narrowed, there is some question if the old pride of the Federal Barge Lines could get itself—much less a tow of barges—up the river today. What a contrast the current tow of twelve barges, sometimes extending more than 1300 feet in length and often 100 feet in width, would make with the FDR struggling to push its tow of barges upstream. Of course the 3600 horsepower available on some modern boats makes the difference. The twin four-bladed propellers, measuring up to 60 inches in diameter, can overcome almost any current the Missouri thrusts at them. Though the modern tow is not as romantic as the sternwheeler of the 1890's or even the bright green of the FDR in the 1930's, it is clear evidence of the revival of commerce on the Missouri River.

Increasing commerce on the mainstem of the Missouri could not expand into major tributaries of the lower reach like the Osage, Grand, or Gasconade rivers. There was no possible way to provide enough water for a modern tow and its barges on these streams. This had not always been the case. The first steamboat to enter the Osage did so in 1837, inaugurating service that would last for over 100 years. Residents of the Osage valley soon requested that the state provide funds to remove snags and build wing dams to deepen the channel. In fact, by 1849 plans for a lock and dam near the mouth of the Osage had been presented. State action was delayed because of political infighting between Whigs and Democrats over who should pay for internal improvements. Not until 1855 did the legislature appropriate funds and even then they were inadequate to do more than limited snagging. To augment state aid an association of Osage River users collected funds and did some snagging and wing dam construction.[25] As time passed, demands for federal action on the Osage became more vocal. The Chief Engineer finally responded in 1870, requesting information about the Osage River. The stream rises in eastern Kansas (there known as the Marais des Cynes), flows easterly for over 500 miles, and finally empties into the Missouri fourteen miles below Jefferson City. Lt. Col. S. F. Reynolds, the officer in charge of Western River Improvements, stationed in St. Louis, Missouri, dispatched a Mr. D. Fitzgerald to study the stream after receiving orders from the Chief of Engineers. Colonel Reynolds reported:

> Mr. Fitzgerald proposes to improve this stream by dredging the shoals, and

25. Neal James Primm, **Economic Policy in the Development of a Western State: Missouri, 1820-1860** (Cambridge: Harvard University Press, 1954), pp. 88, 89, 96, 97, 99; Carl Noren, "Through the Land of the Osages," in Dan Saults, ed., **The Rivers of Missouri** (Missouri Conservation Commission, 1949), pp. 13-15.

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gives it as his opinion that by this method 3 feet of water can be maintained for nine months in the year.

It is to be regretted that the means were not furnished to obtain more accurate data upon which to base an estimate than was done in this case. Mr. Fitzgerald did all that could be expected under the circumstances, and his opinion is entitled to all the weight that is due to one who has seen that of which he speaks. Still the 'examination' was nothing more than what could be made while passing rapidly down the stream, and his opinion cannot be taken as an accurate estimate. He has, however, left so large a margin as to leave little doubt that the navigation of this stream can be so improved as to afford priceless benefit upon the country through which it flows; for if, instead of three feet, as proposed by Mr. Fitzgerald, 2½ or even 2 feet can be maintained during nine months of the year, it will afford the means of shipping a large amount of produce which at present is unable to reach a market. . . .[26]

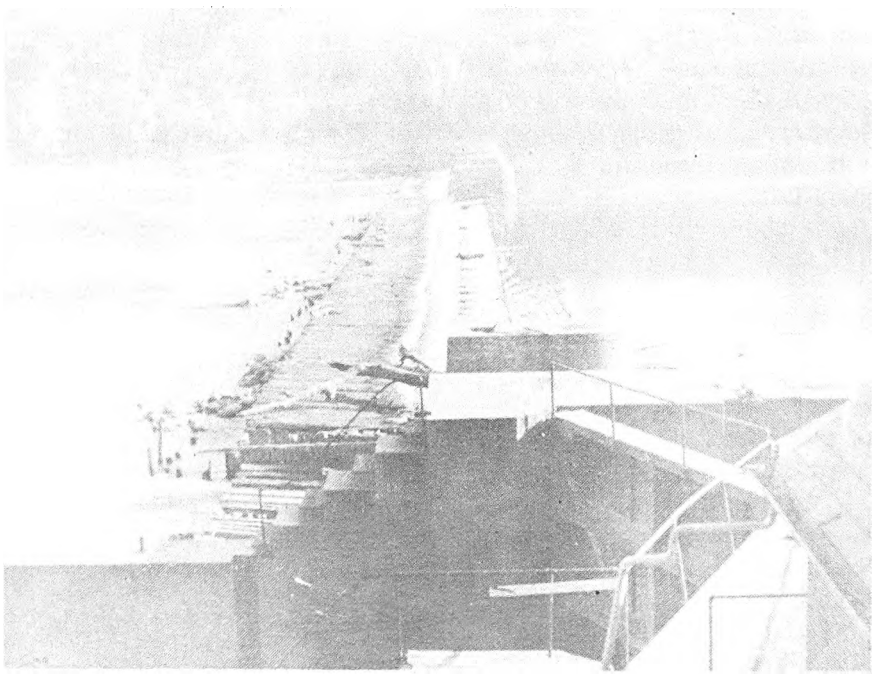
In addition he argued that the area was clearly worth an investment of $200,000 to open navigation between the mouth of the Osage and Roscoe, 238 miles above the point where the Osage joined the Missouri.

In the River and Harbor Act of 1877, Congress authorized the project and work began that spring. However, within a few years it appeared obvious that snagging, dredging, and a few wing dams could not obtain the desired three-foot depth. Thus in 1890 Congress approved the long recommended lock and dam to assure the desired depth. The project was completed in 1906, although the dam soon partially failed and was not totally repaired until 1914. The structure was nine feet high with provisions for increasing the height by movable drums and wickets. A broad "navigation pass" remained at the center of the dam so that rafted items could float over it as well as allowing passage of vessels during high water. The lock was 42 by 220 feet, providing ample room for either rafts or boats.

In the years that followed the completion

Looking across the Osage Dam from the lock side. In this picture, the river is low, giving a good view of the "navigation pass." During the high water, rafts and boats could come straight over the dam, saving the time and effort of locking.

26. **Annual Report, 1871, p. 328.**



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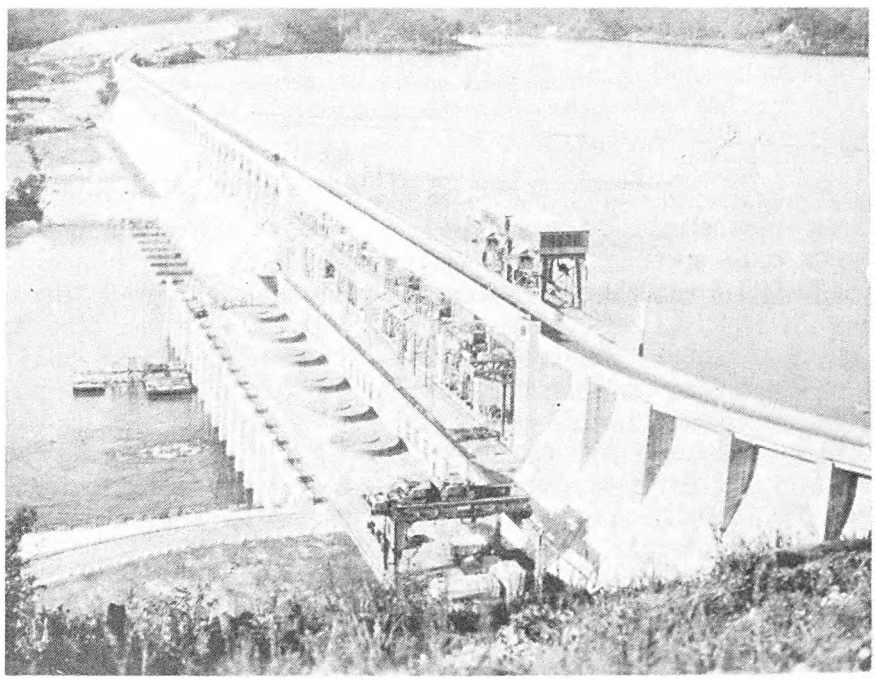
of the lock and dam, commerce continued to increase on the Osage River. In contrast to the Missouri, where navigation had drastically declined, the Osage remained the most economical "highway" into the Ozark region. Great rafts of logs—many cut for railroad ties—floated down the stream; shallow draft steamboats moved the area's agricultural products out and manufactured items in. The rough terrain of the Osage valley plus the limited population slowed the construction of roads and railroads, leaving the river as a prime source of transportation.

Twice in the period after Congress authorized the Corps to improve the Osage, the head of navigation was changed. It was moved back to a point 185 miles upstream in 1902 and then to 171 miles above the mouth (near Warsaw, Missouri) in 1904. It had become obvious that creating a three-foot depth above Warsaw would be almost impossible because of the numerous shoals and rocks. Even so, the improvements made a three-foot channel usually available by 1919. In fact little work, other than two wing dams built in 1925 and '26, took place after this date.

As the 'twenties drew to a close, drastic changes were occurring in the area. Better highways lessened the need for river traffic and, more importantly, the Union Electric Company of St. Louis proposed building a hydroelectric facility at Bagnell, about 80 miles from the mouth. When the dam was completed in 1931, through navigation of the river had come to an end. Also, less than one-half of the desired three-foot channel existed for a number of miles below the dam. As the impounded water formed the Lake of the Ozarks, the region changed even more rapidly. Now recreation became the primary industry and soon numerous pleasure craft replaced the rafts of ties and cargo carriers of the previous decade. On the reach below the dam, sand and gravel soon became the only product moved and just one vessel remained in service. By the early 1950's river commerce had become a thing of the past.

Bagnell Dam ended navigation on the Osage River at a point 80 miles above the mouth. More important, however, was the great change in the area from agriculture to recreation. This view shows the six hydroelectric generators.



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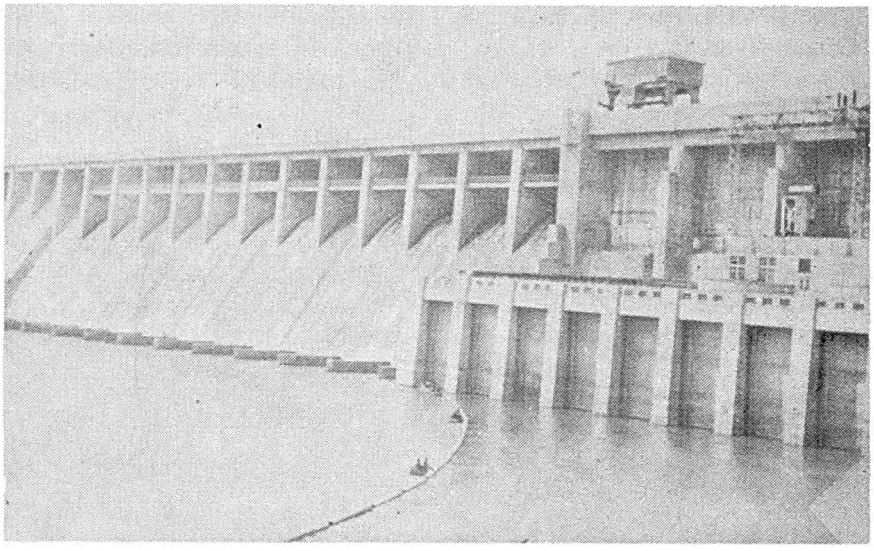

A view of Bagnell Dam from below the spillway. As a private single-purpose project, the Lake of the Ozarks produced power, but had no great effect on flood control.

Given these circumstances, it was only a matter of time until operation of the lock ceased. The Chief of Engineers collected data on numerous "Obsolete Civil Works Structures" and informed Congress in his statement to the House Committee on Appropriations that many could be closed down. On June 15, 1951, the Missouri River Division received notice that operation of the lock should be discontinued. The District posted a formal public notice on September 24, and 45 years of activity on the Osage came to a close.

After closing the operation the District attempted to dispose of the property for state or local use as a recreation area. However, a controversy arose over an easement causing difficulties for several years. Since the land and easements had been acquired in eight different tracts, great confusion developed over access rights. In fact, when the crucial records could not be found for one area, a potential user became "reluctant" to negotiate a lease. The final disposition of the land came on April 1, 1960, when the General Services Administration, which had taken over the property for disposal, sold the whole tract to James N. Rice of Jefferson City, Missouri, for $10,500. The transition of the lower reach of the Osage River to a resort area became more pronounced during the decade after the sale. Numerous cottages dot the shoreline and while the dam still stands, it serves no purpose other than a landmark for local residents. Someday, when serious deterioration has taken place, the Corps will probably be called on to remove it. For the time being, the gateless lock merely provides an interesting detour for the numerous fishermen looking for the ideal location.

Thirty some miles downstream from the mouth of the Osage the Gasconade River joins the Missouri. This stream follows a tortuous 200 mile course through eastern Missouri to its source in the Ozark plateau. In its original condition, it was a series of pools of varying depth separated by gravel shoals. In the mid-nineteenth century local interests made a few improvements and the state provided funds for limited construction. Generally navigation was limited to "jug" boats (so named because they carried empty whiskey jugs into the region to be filled by local "moonshiners") that were poled by three men on each side. Although they drew little more than a foot of water the "jug" boats seldom went further than 50 miles up the river. As steam navigation on the Missouri's tributaries became more important, pressure increased for Corps

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improvements on the Gasconade. Steamboats went into the stream in the 1870's, but not until 1883, three years after Congress authorized improvements, did a steamer, the **Royal**, reach Arlington, some 107 miles from the mouth. Despite snagging, wing dam construction, and channel regulation, the proposed two-foot depth was difficult to achieve any further upstream than the 40 mile mark. In fact the District recommended in 1926 that work along Cooper Hill (the 40 mile point) be discontinued and that a two-foot depth be sought downstream. Even this much attention was questionable since commerce was continuing to decline.[27]

Just as with the Osage Valley, improved roads had made land transportation quicker and cheaper. By 1929 no commercial traffic at all was reported and the District Engineer noted that the improvement on the lower reaches of the stream had not increased usage. Therefore, he recommended no additional work on the river. After 1931, the project was placed on an inactive status and no money has been spent since for either new work or maintenance. The District's interest in the Gasconade continued, but only for its final few hundred yards, where the generally ice-free mouth of the Gasconade provided a winter harbor for floating plant alongside the Boatyard. The Corps' activities on the Gasconade are typical of changes that come with new conditions. In the late 19th and early 20th centuries the stream served the local area and deserved improving; by 1930 other means were available and the Corps acted accordingly.

One of the most unusual projects of the Kansas City District involved the removal of a bridge across the Missouri River at Fort Leavenworth, Kansas. This combination railroad and highway toll bridge was completed in 1872 when the great urban rivalry between Leavenworth and Kansas City was at fever pitch. It joined the Kansas side on the military post, requiring a deep cut in the bluff to accommodate the tracks. The success of Kansas City's railroad ventures quickly placed the Leavenworth bridge in financial trouble. The original company underwritten by Dutch investors went bankrupt in 1876 and a later one was foreclosed in 1886. In the early 1890's a new bridge was built downstream that connected directly with the city of Leavenworth. This made the Fort bridge less convenient and the last train crossed it on December 31, 1893. The ensuing sharp drop in tolls led to another foreclosure in 1899, followed by the collapse of its eastern approach in 1909 and a fire in the planking on the western side in 1913. By this latter date the bridge had become totally useless, standing as a witness to Leavenworth's attempt to become a great Missouri River city.

As the structure continued to deteriorate the Federal government sought to force the owners to remove it. The company countered with an offer to sell it to the government at an extremely low price. Offer after offer was rejected during the 'teens; then the Federal government seized it in 1917 with the intention of using the bridge as a connection with some 900 acres of bottomland on the Missouri side that could be placed in cultivation to aid in food production during the war. The Armistice came before much could be done, leaving the bridge in government hands, but still unusable. On December 20, 1920, the United States Government formally purchased the bridge for $35,000, ending the long series of private companies that had owned it. Increasing automobile traffic and the development of a Federal prison honor farm in the Missouri bottoms led to general repairs and its reopening in 1926 as a free bridge. At best, it was not very satisfactory. The 18-foot roadway made passing difficult and the filling of the old railroad cut at the Fort forced a right angle turn on the Kansas side. When a new highway toll bridge opened a little over a mile downstream in April of 1955, the old bridge closed again; this time forever.[28]

In 1956, Congress authorized removal of

27. **Annual Report**, 1931, p. 1266; Dru L. Pippin, "Autobiography of the Gasconade," in Dan Saults, ed., **The Rivers of Missouri** (Missouri Conservation Commission, 1949), pp. 66-67.

28. Details of the Bridge project are in File No. 1507-21, at the Corps of Engineers Library.

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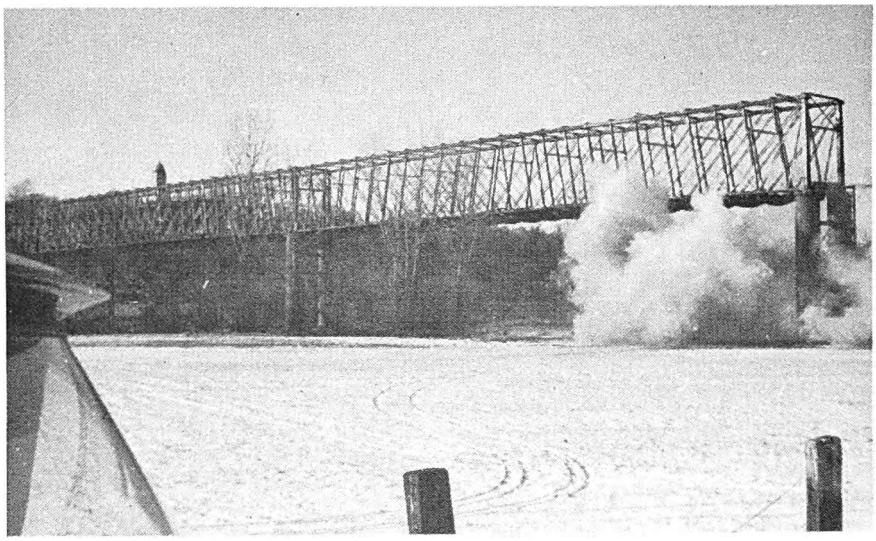
At the instant of detonation, the supports of the center span of the old Leavenworth Bridge are blown down. The project was carried out during the winter so that navigation would not be interrupted. In addition, the lower water levels prevalent in the season made the job easier.



the bridge by the District Engineer and plans were initiated for the project. A major delay developed because the honor farm received its water supply from the Fort via a pipe line carried on the bridge. A well and water mains had to be constructed before the span could be removed. The contract for the water system was let in 1963 at a cost of over $175,000. By the summer of 1964, the dismantling had been completed, making it all but impossible, save for a historical placque, to find where the symbol of Leavenworth's attempt at urban greatness ever stood.

From early keelboats that pushed their way up the sandbar cluttered stream to the powerful towboats with their barges riding before them, the "mighty Missouri" had witnessed great changes. The changes in navigation had easily been matched by the progress of the Corps. Whether taming the mainstream, opening tributaries, or eliminating obsolete bridges, the Corps faced and overcame innumerable problems. To be sure, not everyone agreed with all decisions, yet a quick survey of the river would convince even the most pessimistic that a great deal of progress had been made.

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CHAPTER II: Missouri Valley Floods

To comprehend the second major objective of the Kansas City District–flood control–it is necessary to observe the nature of the problem. While it is true that early bank stabilization projects provided some protection from high water such as erosion or undermining of bridge abutments, the bulk of the work involved improving navigation. The great strides made to tame the Missouri into a usable waterway appeared in Chapter One; here the river will be viewed as the dangerous torrent it can become when more water than the river can hold rushes downstream.

The Missouri River rises on the eastern slopes of the Rocky Mountains and meanders more than 2500 miles south and east until it meets the Mississippi near St. Louis. The stream starts its journey in a narrow valley as a clear running brook and ends as a broad river heavily laden with silt. The Missouri is an excellent example of a river in the early stages of maturity, which means that the stream has meandering channels, eroding banks, a great deal of scouring action, and high sediment content. Throughout most of its length the Missouri wanders over rolling country between two great bluffs in a "bottom" that was cut during and after the last ice age. Captured by the bluffs, the river shifted from one side to the other in what is called its "meander belt." During low water, the river could decline into a number of small streams separated by massive sand bars–a kind of braided river. In high water a torrent could cut a deep, narrow channel or a wide, relatively shallow one covering most of the bottom. The river's behavior depended on flow, the exact location and size of sand bars, as well as the period of high water. With no artificial barriers, the river's course would shift during almost every season, leaving it an undependable source of water or transportation.[1]

As settlers moved into the Missouri valley their reliance on the river was almost complete; indeed, it was their major tie to the outside world. They quickly learned that high water could be "too much of a good thing." Many early towns built levees to control the expected high water–the spring rise as river ice and great plains snow melted and the June rise as the high mountain snow melted–but when bad weather accompanied the normally high levels the protection could fail and severe damage might follow. While floods have occurred on all parts of the river the most serious have been below St. Joseph, Missouri. From this point on the combination of normal rises and the numerous tributaries which can discharge rainfall into the mainstream have caused most of the disasters.

Although great floods have been numerous over the ages, the first Missouri River overflow to be moderately well recorded occurred in 1844. The winter of 1843-44 had not been particularly severe despite heavy snowfall in the Rocky Mountain area. Spring arrived late and was joined by remarkable amounts of rain with over 20 inches falling during May and June at Fort Leavenworth, Kansas. Since bottomland cultivation had not yet led to the clearing of timber from the flood plain and snags and driftwood jammed the river course, the crest would be wide but slow-moving. Indeed there seemed to be unaccountable differences in the timing of the extreme high water that could not even be explained by this phenomenon. Whatever the movement of the crest, the valley experienced one of its worst floods. The steamer **Missouri Mail** reported that "the whole country between Weston, [Missouri, just north of Leavenworth] and Glasgow, [Missouri, 150 miles downstream from Kansas City] was under water." The river level in some places rose from seven to ten feet in a day, with the crest exceeding flood stages at various points from 12 to 17 feet. While records are limited, there is no doubt that the flood of 1844 fell into the category of a "super-flood."[2]

1. Paul D. Barber to Paul R. Munger, November 29, 1972, in a compilation of materials called for in "Environmental Inventory Studies–Missouri River," a copy is in historical file of the Kansas City District, Corps of Engineers.

2. U.S. Congress, House of Representatives, House Document No. 238, 73rd Cong., 1st Sess., 1935, p. 749.

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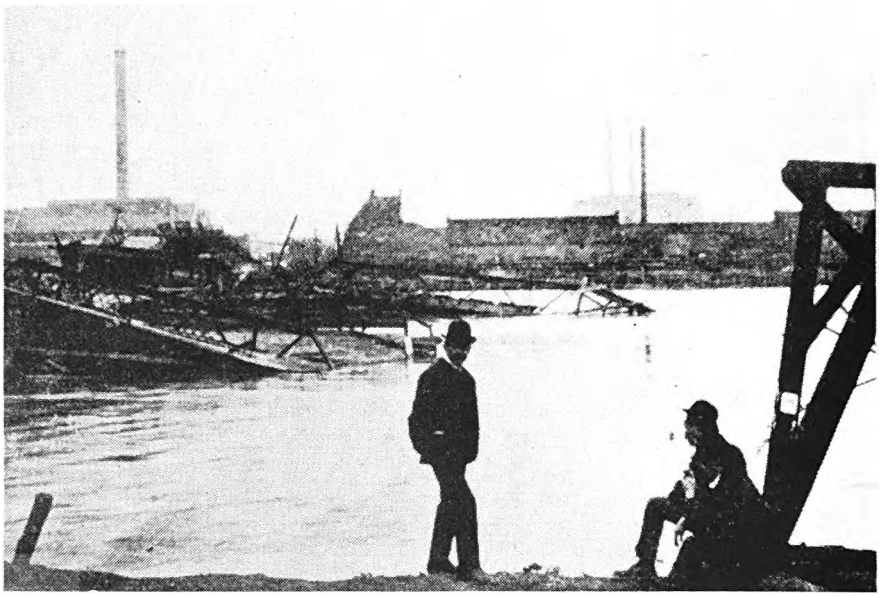
Two observers viewing what had been the Central Avenue viaduct during the 1903 flood.



The flood of 1881 ran counter to the general rule that high water was worse below St. Joseph. It was caused for the most part by cold weather. The winter of 1880-81 was the most severe ever recorded in the area and the season progressed even without the normal January thaw to ease the life of the inhabitants and to allow some run-off. River ice thickness varied from 24 to 32 inches in the Omaha area. As the ice broke up vast crushes were left on the shore. Until mid-April few temperature readings above freezing were recorded. Snow had accumulated to depths varying between 15 and 50 feet. When the ice began to break serious damage occurred all the way from Mandan, North Dakota to Omaha, Nebraska, either from ice crushes themselves or from water backing up behind ice jams. As soon as the ice had drifted downstream the temperature rose and rapid snowmelt sent the river over its banks again. At Omaha the crest was slightly higher than 1844, while at St. Joseph it approached three feet more than the earlier flood. Luckily the limited amounts of rain downstream allowed the crest to diminish quickly. Kansas City experienced less that six feet over flood stage and St. Charles had less than four. If heavy rain had accompanied the late thaw of 1881 much greater damage would have occurred throughout the basin.[3]

By the early years of the twentieth century, the economic development of the Missouri valley had created a situation where a flood would do great damage to both rural and urban areas. Most of the bottom land had been brought into cultivation or developed for industry near cities. The West Bottoms at Kansas City had emerged as one of the major meatpacking centers of the nation, while railroad yards and other industries existed in low areas at numerous other cities. In 1903, the time was ripe and nature took advantage of the conditions in the classic sense. Just as the June rise began, great rain storms covered eastern Kansas and Nebraska and western Iowa and Missouri. During eleven days (May 21-31, 1903) from 5 to 15 inches fell. Soon, the Kansas River was bank-full and by May 26 flooding became general. Kansas City's bottoms were overrun, leaving packing plants, stockyards, railroad shops, and many other plants under 8 to 10 feet of water. In direct contrast to 1881, the flood had little effect north of the mouth of Missouri's Platte River,

3. Ibid., pp. 750-51.

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a few miles downstream from Leavenworth, but increased in volume and intensity downstream. The Kaw (or Kansas) River had been the focus of the heavy rain, in places totalling over four inches in three days, and its waters rushed down the valley to the junction with the Missouri River at Kansas City. The impact on the metropolitan area was tremendous.

> It was a calamity that paralyzed the city, not fully realized until the lights went out, water faucets no longer trickled and lines of refugees came up from the West Bottoms. The crowds that lined the bluffs overlooking the Kaw valley saw a terrible picture of devastation. Along with the industrial city a large share of its business was then concentrated in the bottoms. The railroads and the old Union depot were there. Farther south and on the Kansas side of the river were residence areas.
>
> The crowds saw the whole valley as one vast river miles across. They saw homes floating, twirling and bobbing on the crest, until they crashed against the bridges. The dark tops of locomotives showed black humps above the water. Livestock from the stockyards was forgotten in the efforts to save human life. Bridges buckled and went under before the impact of great, floating oil tanks.
>
> At night the miles of river were lighted by the fires of industrial buildings and freight cars burning to the water line. Of the seventeen bridges across the Kaw river only one survived. Among those to go was the bridge carrying Kansas City water pipes from the main pumping station in Kansas. Some 22,000 persons, all but 2,500 from the Kansas side, were left homeless.[4]

Further downstream the flood filled the valley from bluff to bluff as the crest was increased by flooding on the Grand, Osage, and Gasconade rivers. In some places, the river stretched eight miles across, reminding

4. Henry Haskell, Jr. and Richard Fowler, **City of the Future** (Kansas City, 1950), pp. 93-94.

Some of the destruction wrought by the 1903 flood. The scene is Kansas Avenue and Fourth Street in the Armourdale District of Kansas City, Kansas.

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observers of the ancient geological age when the valley was being cut. As the water receded toward the middle of June, residents totalled their losses. Kansas City alone had damage of over a million dollars, while millions more had been lost in rural farmland and other urban sites. Both Topeka and Lawrence, Kansas, had been ravaged as the Kaw crest moved downstream. It had become obvious that the future economic development of the area would require improved flood control.

Both Kansas and Missouri already had laws on the books allowing the creation of "Drainage Districts" in specified areas that could finance and construct levees for flood protection. Kansas improved its law in 1905 in response to the 1903 flood. Missouri's legislation was not expanded since procedures were available to create districts that could control the high water. The problem was to get agreement among property owners to accept the costs of protection. In the period after 1903, flood protection was constructed in the Kawsmouth area. However, in most cases the levees were not high enough to withstand a crest equal to 1903. Divided authority, resistance to spending the necessary funds, and a naive belief that another superflood would not occur all hindered local efforts at serious flood control.

Those who believed that flooding was on an infrequent cycle had their faith tested almost every year after the great disaster. In 1904 the river surged to four feet over flood stage at Kansas City; in 1905 it reached almost two feet above bank-full; then after skipping only one year it was in flood during July of 1907, June of 1908, and July of 1909. The worst high water was in 1908 when Kansas City had a crest of nine feet over flood stage. While this was markedly less than the fourteen feet recorded in 1903 it still created a serious crisis. The local levees were unable to keep the water out of all the low lying land, but early warnings of the flood had permitted the removal of most merchandise and livestock from the West Bottoms. In addition the railroads were able to transfer most of their rolling stock to higher ground. Even so damage in the Kansas City area reached an estimated $650,000. One direct effect of the constant danger of flooding in the West Bottoms was the construction of a new railroad station on higher land to the south of downtown Kansas City.

The river tended to be more peaceful during the second decade of the century than it had been during the first, yet high water years never seemed to be far apart. The most remarkable year for extended flood conditions was 1915. No less than five times did the river reach bank-full. While the crests varied from less than two feet to a full seven feet, the floods took their toll. For one thing, literally no river improvement work could be carried on because of the water level; for another, a good deal of damage was done to levees and bank control works by the constant heavy flow; and, finally, actual destruction from the floods in the Kansas City area totalled some $300,000.

Partly in response to numerous private requests for aid in fighting river damage during this period, Congress authorized cooperation between local interests and the government in the 1915 River and Harbor Act. The terms would be a 75 percent payment by local landowners and 25 percent by the United States. Generally, the primary purpose of such cooperative work would be to protect the banks of the Missouri River from erosion. However, in some instances flood control projects were assisted. Since the Corps of Engineers had little direct involvement in flood control before this time, the legislation was an important turning point even though no dramatic changes occurred for some years.

The slow but steady growth toward a national policy on flood control was easy to understand. Industrial and agricultural growth had expanded into numerous flood plains making high water conditions equal to national disaster in many regions. If local interests were left to bear the vast majority of the cost of flood control it would continue to be inadequate and inequitable. Thus, the first major step came in 1925, when the River and Harbor Act of that year called for an estimate of the cost of an investigation relative to the "development of the potential water power, the control of floods and the needs of navigation." In response to this request, the Chief

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of Engineers drafted a statement in which he estimated the cost of the survey and the information to be obtained. This response was later published in House Document No. 308, 69th Congress, 1st Session and soon became a convenient way to label the broad study. Hearings, reports, and investigations all over the country referred to the "308" report, even though the document itself "reported" nothing other than an estimate of the study's cost. The actual authorization to commence work did not come until 1928 when Congress was again jogged into action by the disastrous floods of 1927. Although the worst floods of that year were on the Mississippi River, the Kansas River did serious damage leading to a crest almost three feet over flood stage at Kansas City.

The Kansas City District started to carry out the survey as soon as funds were available. Hearings at numerous cities on the Missouri and its major tributaries, studies on water flow, navigation requirements, and flood control data were all aspects of the work undertaken. Much of the information would be published as part of an overall report on the Missouri River in 1935.[5] As if reacting to all the emphasis on flood control the river took a contrary turn and became as placid as a brook. The years of the early thirties were ones of serious drought leading to record low flows on the Missouri at Kansas City and other points. No one could doubt that floods would come again, but it was hard to believe when the river acted as tamely as it did in this period. In many ways, this shift of rainfall cycles was extremely helpful, since it allowed numerous projects to be undertaken during the middle and late 1930's.

The lack of rainfall that had been a blessing to flood weary midwesterners became a curse for agriculture as crops withered and topsoil blew away. The "dustbowl" years made the hard times of the Great Depression absolutely intolerable for many residents of the great plains. By the time World War II had started the cycle had changed again, bringing excellent conditions for producing badly needed foodstuffs. Yet with the change the danger of flooding returned. In many ways, the problem of restraining the river was complicated by wartime restrictions on non-military projects. Levees, dikes, and other controls that suffered damage were simply not repaired.

During the spring of 1943, the Missouri literally made up for its good behavior of the last several years. First, the spring rise hit the upper river with unusual rapidity as a heavy mountain snow melted under an early "heat wave." In the Omaha area, flood waters approached the record levels of 1881, disrupting transportation, inundating large sections of the city, and destroying thousands upon thousands of acres of crops. In May, the lower river valley had heavy rains followed by floods that covered more than 500,000 acres of farmland. Finally, the Kansas River basin was hit by a storm that dropped some seven inches of rain, starting a flood that hit the Kansas City area just as the Missouri was experiencing its June rise. Another 960,000 acres were inundated and an estimate of damage throughout the Missouri basin during the whole period of high water totalled more than $47,300,000. Many other areas of the country suffered equally bad floods, making 1943 one of the worst overall for national flood disasters in many years.

The wet cycle continued into 1944, when the nation again suffered from widespread flooding. The Missouri River basin had high water during both the spring and June rises. In April, heavy rain in Kansas sent the Osage and Kaw rivers out of their banks. Then, two months later, a heavy rain in the upper Missouri valley kept the river near bank-full. Before it was over, more than a million and one-half acres along the Missouri had been inundated. Although Mississippi River floods were much worse than the Missouri's, the nation was again experiencing heavy losses from uncontrolled rivers.

Under mounting pressure for some kind of action, Congress finally enacted a comprehensive program for water usage and control in the Missouri basin in 1945. The Pick-Sloan Plan became the blueprint by which the river

5. U.S. Congress, House of Representatives, House Document No. 238, 73rd Cong., 1st Sess., 1935, provides a good summary of all major floods.

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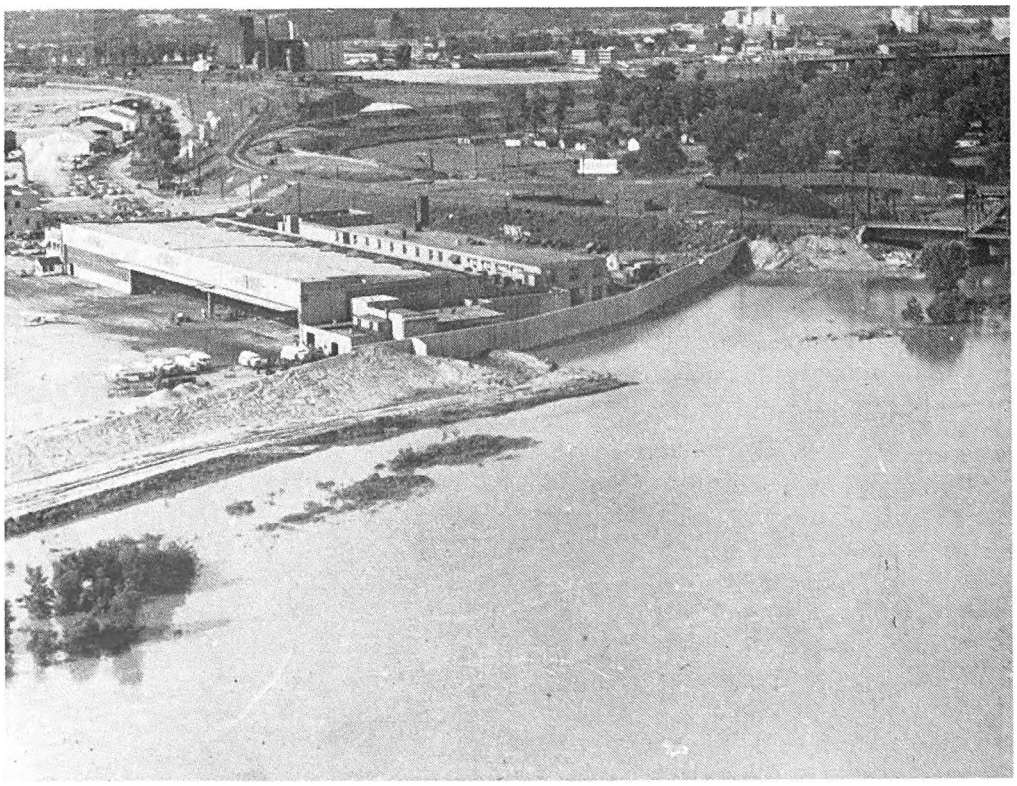
The flood of 1944 washed out railroad lines badly needed for the war effort. This shot shows workmen trying to save tracks a few miles above St. Charles, Missouri.



The recently completed floodwall protected Kansas City's Municipal Airport from the 1947 flood.

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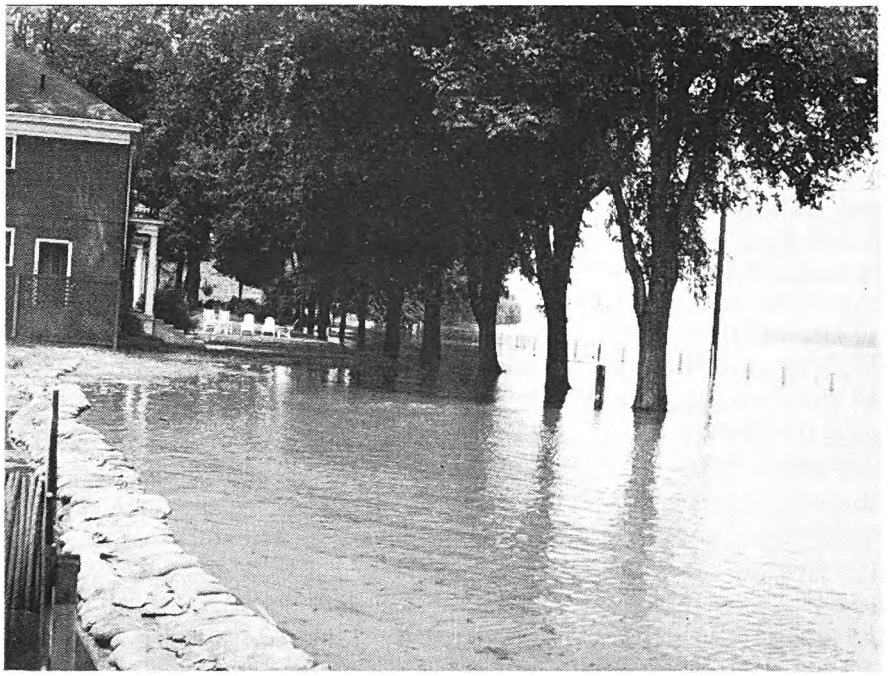

At the Gasconade Boat-yard the flood of 1947 reached almost to the steps of the staff housing. The sandbags in the foreground protected the lower lying parts of the yard.

would be tamed. The details of the project will be considered in the next chapter. Although Congress gave the Corps a plan and the return of peace made it possible to revive river work, a great deal of time would be required to complete the project. In the meantime, the danger of floods still existed.

The late spring of 1947 tested many of the defenses already built and showed where more were needed. Actually, the storm that started it all moved quickly across Nebraska and Iowa, dumping more rain on Illinois than on the two more western states. However, Missouri underwent its second wettest spring in history, while neighboring states received about twice as much precipitation as usual. In some ways the numerous storms helped keep the flood danger at a minimum since temperatures were generally below seasonal averages during most of the spring. When the June rise occurred it was heavily augmented by additional storms and a major flood crest came down the Missouri. High water records were recorded at Rulo, Nebraska, Waverly, Missouri, and almost set at St. Joseph, Missouri. The completed flood control works protected property at Kansas City valued at $270,000,000, as well as over 14,000 acres of agricultural lands. Flood threats during 1947 had been numerous, yet damage had been held down by the District's emergency work, Fort Peck Dam on the main stem of the Missouri in Montana, and other completed flood control works.

Following the wet year pattern, several floods occurred again in 1948. No appreciable damage resulted from the minor overflowing along the Missouri River's mainstream, but serious floods took place on the Osage, Kansas, Republican and several other rivers. The June flood on the Osage resulted in the Lake of the Ozarks reaching 3.1 feet above the full pool. During several days of high water, Bagnell Dam was releasing at or near 100,000 cubic feet of water per second. This resulted in serious damage on the lower Osage and led to a controversy over the lake's effectiveness in flood control. Many residents believed that the lake could have reduced the crest substantially. Even though Kansas City District representatives explained that this privately-owned hydroelectric operation was not con-

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structed for flood control, a good deal of ill will continued.[6] Fears of a second crisis occurred in August, when heavy rains sent the upper Osage out of its banks again. This time, however, the crest subsided before reaching the Lake of the Ozarks and no damage took place below Bagnell Dam. Several towns on the Black Vermillion River in Kansas were not so lucky. Heavy rains sent this tributary to the Big Blue out of its banks at Frankfort, Kansas, to a depth of three feet, causing almost $150,000 damage to the town. By the end of the 1948 flood season Missouri basin rivers were keeping the population well aware of what could happen if the conditions were right.

Throughout 1949, the Kansas City District kept close watch on numerous heavy rainstorms that caused severe floods in a few localities. For the second year in a row Frankfort, Kansas, found the Black Vermillion River covering almost half of the town. But in general, the year was a quiet one. Of course, the continuing construction of flood control works played a part. In the District's "Report of Floods and Flood Damages" it was estimated that Fort Peck prevented $2,630,000 in flood damage and that other projects saved property valued at an additional $630,000. There seemed no doubt that floods were becoming less and less of a serious problem.

As the spring rise reached the upper limits of the Kansas City District in April of 1950 a pessimist could have concluded that it was going to be a bad year. Rulo, Nebraska, experienced a record flood stage on April 30, and the Missouri went out of its banks in several places from there to St. Joseph, Missouri. Luckily the high water was of short duration. For the rest of the season floods played a "hit and run" game. Flash flooding followed intense rainstorms in the Kansas River basin, while the Osage left its banks in both July and August. At the end of the year, the District Engineer estimated damage from floods at over $12,500,000 in his District. Given the highly destructive nature in very small areas of some of the flash floods on

6. The same kind of debate had developed during the 1943 flood on the Osage. C. R. Van Orman of the Kansas City District Office noted the charges in his diary June 5, 1943. The original is in the historical file of the Kansas City District, Corps of Engineers.

Despite the absence of general flooding in 1949, the residents of Seward, Nebraska, suffered when the Big Blue River went on a rampage in March.

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Kansas River tributaries, the total was remarkably low.

When flood control experts consider the kind of protection needed for any given area they talk about the "100 year flood" (frequently called the Intermediate Regional flood) or the "500 year flood" (the infrequent Standard Project or "maximum known" flood) as indications of what a superflood would be. Few people expect to see the "100 year flood" and even fewer can comprehend the "500 year" deluge. Since a great deal of flood control work had been done on the Missouri River during the 1930's and '40's, a general belief existed that no superflood of the 1903 variety would ever occur again. Even the wet cycle that had gone on for some years before 1951 had not overly concerned Missouri valley inhabitants. Thus, the great flood of July, 1951, came as something of a shock. In fact, it took on aspects of a spectator sport, with vast traffic jams of sightseers, and quickly produced souvenir booklets depicting the disaster. Despite the crisis, which included unsafe drinking water, loss of electric power for many, danger of epidemic, and the closing of numerous businesses, a kind of holiday atmosphere existed. The Kansas City District had to undertake flood prevention as well as emergency rescue operations to the backdrop of milling crowds.

Prior to June, 1951, the situation remained near normal. Both the spring rise and the June rise on the Missouri had been easily controlled. The overall level of flood control works appeared satisfactory for most emergencies, with the Federal project at Kansas City 58 percent completed and many other levee systems totally done. One factor that was beginning to concern meteorologists was the continued, well above average, rainfall in the Kansas River basin after May 1. Slowly but surely the soil was becoming so saturated that additional precipitation would run off far too quickly. Hopefully the weather system that seemed "stuck" over the midwest would slide eastward, allowing the wet spring to move on to a drier summer. During June the system stayed put, dumping from two to three times the normal rain on the area. Then in early July cooler air drifted into Kansas only to be stopped by a strong flow from the Gulf of Mexico. Starting on the 9th and extending to the 13th a storm of incredible magnitude occurred. The rain came in three distinct bursts on three successive nights with close to half the total coming on the second night. Unbelievably the storm focused almost exclusively on east central Kansas. The series of crests which rushed down the Kansas and Osage rivers were impossible to predict or control. In some ways it was an area-wide "flash flood" with water sometimes rising ten to twelve feet in a few hours. The rapidity of the cresting made it difficult for the District Engineer to provide the necessary advice and assistance to local residents. The task was also complicated by the fact that many of the cities on the Kansas had successfully resisted a number of crests from the June rain and seemed confident that their efforts would not fail in July.

At Topeka, Manhattan, and Lawrence, Kansas, local governments rallied volunteers to strengthen dikes, build temporary sandbag levees, and the many other tasks necessary during a flood. In many instances hard work was rewarded and the floodwaters were kept out. The Topeka waterworks was an example.

> The success of this fight is remarkable considering the fact that the flood crest coincided almost exactly with the height of the levee. Credit for this success is due to the people and officials of Topeka for their willingness to follow the directions of the Corps of Engineers, for their speed in mobilizing their forces, and for the diligent work of the volunteers and others engaged in the fight.[7]

On the other hand the failure to protect South Topeka brought forth this comment:

> The major portion of the South Topeka unit might not have been flooded, even after failure of the [sandbag closure of] Ward Creek gap (provided the area did not pond too quickly), if a low levee had been placed along the top of the Rock Island railroad embankment from the Rock Island

7. **Report on Flood Fighting, Rescue, and Rehabilitation in the Kansas City District during 1951**, p. 29.

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bridge over the Kansas River to the point where the railroad tracks near the bluff, thence tying into the bluff. Such a levee would have had to be about 3 feet high and 1,200 feet long. Local officials apparently did not realize the possibility of this expedient. Emergency measures of this type should be given consideration in future flood plans and operating instructions.

The flooding of the South Topeka unit is regrettable in the light of the fact that it might have been prevented by a vigorous fight. . . .[8]

As the crest approached the Kansas Citys, emergency levee repairs were undertaken. Just as cities upstream, the earlier floods had been confined and optimism remained high even though numerous cases of serious erosion had been discovered. A major problem that would beset the Corps' flood fighting efforts in the metropolitan area involved the many different local governmental subdivisions with which they would have to work. There were not only two states and three major cities, but various Drainage Districts as well. Merely coordinating activities with so many units created a problem. Moreover, when they worked at cross purposes—as when the Kansas City, Kansas, power plant cut off power to the Fairfax District to avoid fires, but inadvertently cut off power to the Jersey Creek pumping plant—the impact of the flood was much worse. In many instances, all the work in the world would have been to no avail because the water was four to six feet higher than the levees. In some instances the river was rising so quickly that flood walls were being overtopped a mile or two upstream from a gap that did not yet require closing. Conditions of this sort made flood fighting next to impossible.

The highly developed Central Industrial District provided an example of the flood's speed. At 10:00 a.m. on July 13, the water had just about reached the top of the floodwall. Over the next hour the Kansas River rose an incredible 1.8 feet. The area started to fill up like a tub and city officials ordered the area evacuated even though workers had been told to report to their jobs that very morning because the floodwall would protect them. The evacuation was remarkably orderly, given the circumstances, although many cars stalled in the deepening water or were caught in

8. Ibid., p. 23.

Kansas City's Central Industrial District flooded in 1951 at a remarkable rate as the Kansas River rose several feet higher than the floodwall.

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The 1951 floodwaters of the Kansas River enter the Missouri from the Central Industrial District "waterfall". In this unusual reversal, the floodwall kept the flood in, rather than out!

This view of the Jersey creek box culvert, taken several days after the river crested, showed the massive damage done to the culvert. A roadway which ran across the culvert had been completely washed out.

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traffic jams (partly caused by sightseers). In the end, most people simply walked up the bluff to safety with no more than the clothes on their backs. Only two people were drowned in the Central Industrial District, a fact that was as welcome as it was unlikely.

The flooding of the Central Industrial District set off a "chain reaction." Fuel tanks soon broke loose starting fires in several places. Floodwater began to pour into the East Bottoms and was only stopped with great effort. Finally, in one of the most unusual sights in the history of flood fighting, water over-topped the Missouri River floodwall from the landward side, allowing Kansas River flood water to cascade into the Missouri along a great stretch of the waterfront. As buildings and boxcars burned to the waterline, drifting material damaged numerous properties as well as the Missouri floodwall, which was not constructed to take so much pressure from the inside. When a final estimate of the damage for the area was made, it came to $139,077,000.

One of the most frustrating chapters of the fight took place in the Fairfax-Jersey Creek area. Here, a great struggle went on to keep the plant that pumped Jersey Creek water over the levee into the Missouri operating while work gangs repaired the desperately overworked levees. Early in the battle, a gap had been improperly closed despite several calls from District personnel. Ultimately, a sizable portion of the flooding would come from this spot. Of more importance were the breaks in the pavement over the box culvert that carried Jersey Creek. A great effort was made to build "ring" levees of sandbags around these leaks in order to avoid flooding and erosion from inside the main levee. Again and again, rumors spread that the levee had broken. On several occasions, volunteers put down their tools and ran for higher ground. Pleas for additional help received only limited response and those who wanted to aid found it difficult to get across the inter-city viaduct because of the crowds of curious onlookers. The area was finally lost to the river through a mistake. On July 13 the Fairfax Drainage Board decided the District would be flooded. The Phillips Refinery blew its whistle—apparently to tell its employees to go home—and everyone left their flood fighting jobs. The next day a Corps of Engineers officer returned to the area, reviewed the situation, and decided that too much additional erosion had taken place overnight to make additional work worthwhile. Later in the day the river levee near the Jersey Creek outlet gave way, flooding the District. The tragedy of Fairfax was that with proper cooperation the flood clearly could have been prevented.

Two successes in the fight took place close by. The Corps rallied the Fairfax workers and built a temporary levee between the flooded area and the Kansas City, Kansas, municipal water and power plant. Hard work and considerable luck in obtaining portable pumps to rid the protected area of seepage saved the plant. Directly across from the mouth of the Kansas, the North Kansas City levee protected the Kansas City municipal airport. Under normal circumstances the Missouri River flows past here quietly; even when the river is high the bulk of the scouring takes place on the other side of the bend. However, during the flood conditions were reversed. The Missouri literally became a tributary to the Kansas and the rapidly flowing Kansas cut across the Missouri and started to erode the airport levee. If this levee had broken, all of North Kansas City would have been inundated. By 6:00 a.m. on July 14 the riprap (stone covering on the river side of the levee) protection had been worn away and within a couple of hours the levee had been cut halfway through. A District officer found the danger spot, organized a work party, and started filling the weak spot with rock. Later, impounded automobiles would be dumped into the break to help reinforce the levee. As the level of the Kansas River subsided the danger passed, saving North Kansas City from a major catastrophe.

Downstream, the Missouri carried the Kansas River flood on its devastating journey. Several bridges were endangered; the new one over the Liberty Bend Cut-off was put out of service for three months when the north approach was completely washed away. Literally every agricultural levee was breached or overtopped. At the crest, 973,000 acres were under water. The Gasconade Boatyard was purposely flooded from the Gasconade River

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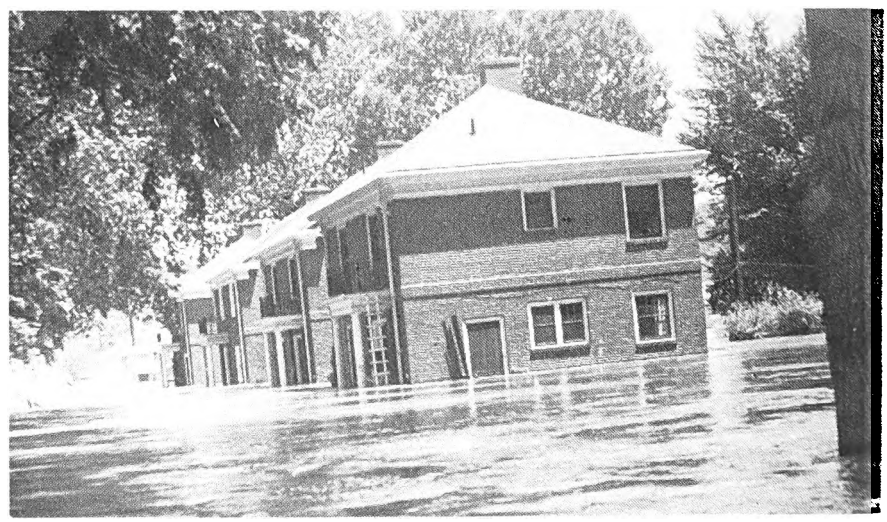
The airport levee on July 16, two days after it had almost been breached by the crosscutting action of the Kansas River. This view shows a long line of dump trucks dropping stone into weakened areas.

The river level at the Gasconade Boatyard shows how much worse the 1951 flood was in comparison to 1947.



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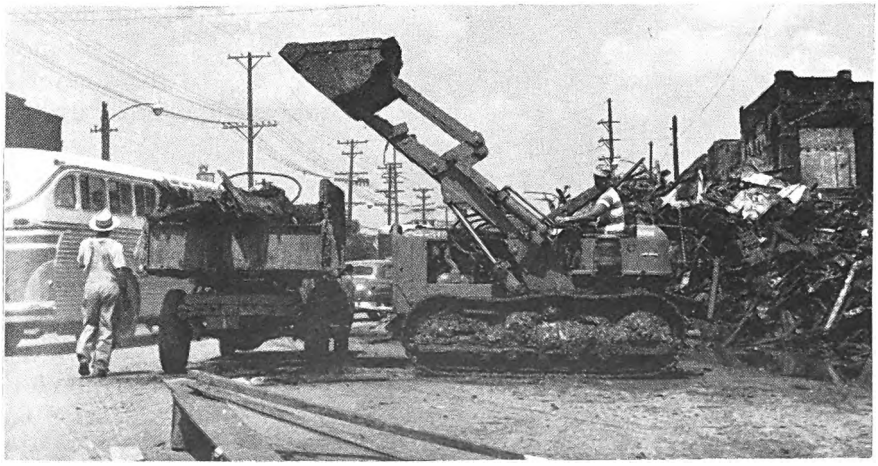
With the capitol as a backdrop, a Jefferson City resident makes his way through one of the less deeply flooded parts of Missouri's capital during 1951.

to avoid current damage when the Missouri topped the levee. After this was done the Boatyard spent several days under water. Many cities on the mainstream of the Missouri suffered flooding—Jefferson City evacuated nearly half of its residents—but in comparison to the Kansas River basin the damage was slight.

As can well be imagined, the aftermath of the flood was almost as taxing as fighting the rising waters. By July 16th the District Engineer had set rehabilitation plans into motion, including organizing sub-units under civilian personnel and providing for necessary equipment to do the job. Floods leave behind them an incredible amount of silt and mud. When oil storing facilities are destroyed, the residue has an odor and adhesive quality that further complicates the job. Since the Central Industrial District included the Kansas City stockyards, thousands of dead animals had to be recovered and disposed of. Also, because so

The clean-up operation on Kansas City's Southwest Boulevard was complicated by the fire damage that had occurred after the flood water drove oil storage tanks into electric wires. Here, charred, water soaked debris is loaded into a dump truck.



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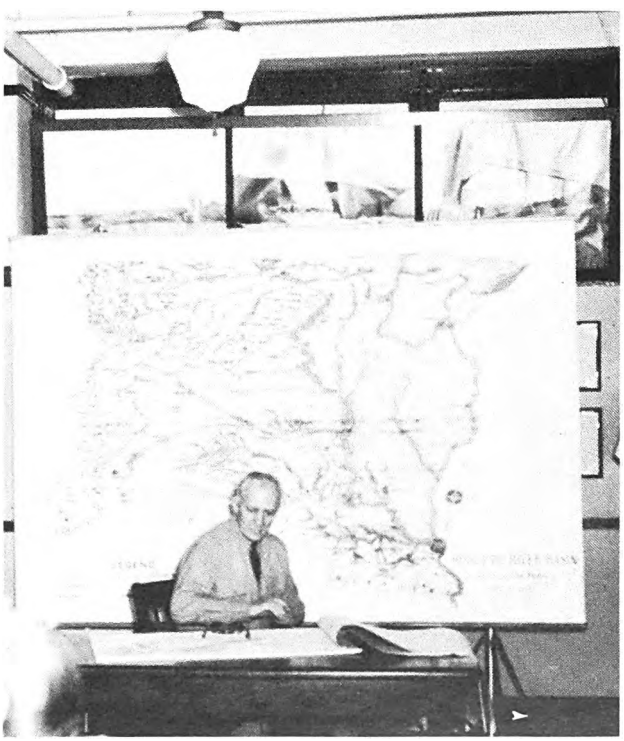
many automobiles had been abandoned in this area, a massive removal and reclaiming project had to be undertaken. President Harry Truman flew to the stricken area, observed the damage and promised Federal assistance for rebuilding. Slowly but surely, in city after city, the debris was removed and normal conditions started to return.

Literally at the height of the flood, plans for restoration of damage vied with proposals for additional flood control work. Maj. Gen. Lewis A. Pick, chief of the Army Engineers and coauthor of the Missouri Basin water control plan, visited Kansas City on July 14 to discuss future flood control proposals. At a quickly called meeting with local leaders, General Pick again stressed his oft-repeated solution to the flood problem. The **Kansas City Star** gave detailed and sympathetic coverage:

> The answer to the flood, the biggest economic black eye Kansas City ever has sustained, is 'never again.'



General Lewis Pick at his "command post" on the sixth floor of the Davidson Building. He lost neither time nor opportunity as he stressed what should be done to avoid another 1951-type flood.

> Flood prevention leaders of Greater Kansas City, in a reaction meeting yesterday, said the entire dam-and-reservoir program for the Kaw River and all of Kansas must be quickly completed.
>
> There lies the hope for never again, they agreed, and they built a fire under the cry after Maj. Gen. Lewis A. Pick, chief of army engineers, told them the federal government can finish the full Kansas program in four years if it gets the go-ahead and the opposition is overcome.

COST IN TENS OF MILLIONS

And the cost? Three hundred millions or about the same amount as the loss sustained in Greater Kansas City in the last few days, the general estimated. He said the loss including Kansas towns would total about 500 million, and maybe more if job disruptions and intangible losses are considered.

In comparison with bigger projects for conservation of the nation's resources, the full Kansas flood prevention program would be 'small potatoes,' it was pointed out.

Meeting at the Kansas City Club, thirty-five persons, including the mayors of the two Kansas Citys, heard the general predict the Kaw will hit again unless it is harnessed on a comprehensive scale, not by little ponds or dams that opposers of big scale control have said would do the trick.

'Why did it happen here Thursday?' General Pick asked. 'Because there just isn't room enough for all that water between the two bluffs at the Kaw's mouth. There never has been, and there never will be until the water is impounded upstream in big reservoirs.

'Flood engineers have said this a long time, and the Pick-Sloan plan for Missouri river and tributaries control is based on this. We knew it would happen, and, gentlemen, it will happen again just as sure as God makes little green apples grow bigger.'. . .[9]

9. **Kansas City Star**, July 16, 1951.

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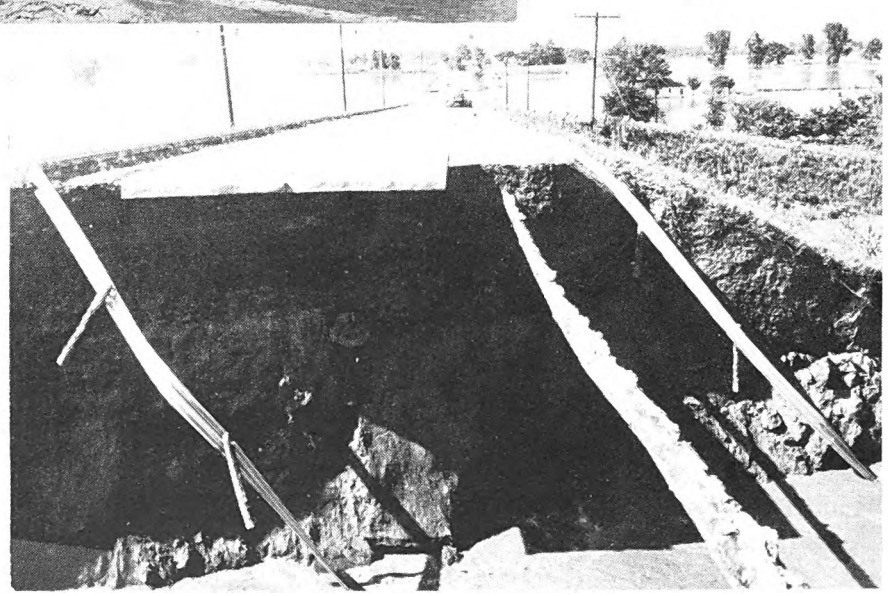
In the Armourdale District of Kansas City, Kansas, the flood-water destroyed everything in its path. The store below bears mute witness.



Downstream from Kansas City at the Liberty Bend cut-off, a twenty foot stretch of the roadway was washed out.

Reports spread that flood control dams would be started as quickly as possible. Long time opponents of many projects reversed themselves, publicly calling for reservoirs. Both public and private groups met to rally support for flood control projects. The damage done by the flood was so vast—nearly $140,000,000 in the Central Industrial District, over $93,000,000 in agricultural areas—that almost any expenditure for flood control seemed small. As usual, dissension reappeared as time passed, yet briefly the people in the

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The flood ripped barges from their moorings and threw them against the Hannibal Bridge. Luckily, the bridge survived, despite considerable damage.

flooded area were united behind General Pick's dream.

As in any great catastrophe the 1951 flood generated innumerable responses. From a rapid decline in opposition to new reservoirs and discussions over how the flood control plan could have been better operated to proposals for massive aid to rebuild stricken areas and new Missouri River bridges, changes took place in almost everyone's thinking. Area newspapers kept the editorial comments at a fever pitch in an attempt to stress the "never again" concept. The cost of completing a flood control system was compared with flood damage—ranging from 300 million to one billion dollars—and any objection to finishing the planned works was dismissed. The "100 year" flood had come and gone, but interested parties fully intended to use it as a factor that could not be ignored when future flood control projects were considered.

As if to remind residents of the Kansas River basin that nature was not on a strict schedule, unseasonably heavy rains began again in September, 1951. Because many levees and floodwalls had been weakened or breached by the July flood, the District Engineer recommended twenty-four hour patrol of protective works in the Kansas City metropolitan area. In addition, levees were strengthened in several places and a "tie back" levee was started in the Fairfax District near the location of the July failure. Most business firms cooperated fully when property removal was suggested and almost all railroad rolling stock, along with a great deal of other property, was removed to higher ground. Luckily the crest failed to reach the predicted level and no new flooding occurred at Kansas City. At Topeka local officials held the river in check although some 2,000 residents were evacuated. Other than an additional 1,000 people removed at Ottawa, Kansas, the Corps did little rescue work during the September flood.

The nervousness of area residents became a problem for the District. As the Kansas River rose telephone requests for flood information reached significant proportions. Rumors ran rampant, as an entry in the District's Executive Officer's Log indicated:

> Mr. Ray Morgan, Kansas City Star, called, stating that his office had received a report that the Engineers had asked a lady in Armourdale District to evacuate and wanted to know if this were a fact. I assured him that this office had not issued any such instructions for evacuation. I informed him that we had equipment working at the present time at Mile 5.3 in the Argentine District and with present predictions, expected to hold the levee.[10]

More difficult than settling rumors was convincing people in the Central Industrial District that ample warning would be given by city officials if the area needed to be evacuated. The rush to avoid another flood was an experience few businessmen wanted to repeat. On September 7th the Executive Officer made the most welcome entry of the year:

Called Reed McKinley, City Engineer,

10. Executive Log, 1951-52, Sept. 4, 1951. The Log is in the historical file of the Kansas City District, Corps of Engineers.

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An aerial view of the 1952 flood east of Rulo, Nebraska. The agricultural levee in the center of the picture protected the farm land from inundation.

Kansas City, Mo. and Mr. Armstrong, City Engineer, Kansas City, Kansas, and officially notified them that this office considered that the flood emergency had now passed, and briefly outlined the status of our emergency levee repair work. The City Engineers of both Kansas City, Mo. and Kansas City, Kans. expressed their appreciation for the prompt and efficient manner in which the Corps of Engineers functioned in the emergency. Mr. Armstrong was particularly lavish in his praise. I in turn expressed the appreciation of this office for cooperation rendered by both city offices. JKA

[Lt. Col. J. K. Addison]

As 1951's autumn precipitation continued into winter it became obvious that the great plains snow cover could cause another flood crisis in the spring of 1952. When the March thaw started sending rivulets into the Missouri River tributaries the icebound mainstream soon backed up, producing local flooding. By early April crests were reaching Dakota cities and on April 1 the river reached flood stage at the northern boundary of the Kansas City District. From then until May 6, Rulo faced a river above flood level. In fact, the river reached new records in several places along the Kansas-Missouri border. Atchison and Leavenworth had higher water by several feet than ever before in history. St. Joseph almost matched the record of 1881, but actually exceeded the old flow record. The city of St. Joseph, situated mostly on high ground, did not suffer great damage. Most of the industrial packing plant area on the flood plain was protected by emergency levees which saved the vast majority of the area from damage. However, its airport across the river was completely inundated and the flood cut a new channel which for some time threatened to leave the city without any locations for water intakes or sewage discharges. Although the Corps would ultimately return the river to St. Joseph's waterfront, the losses in business activities reached more than a million dollars and the damage to Rosecrans Field totalled more than $600,000.

Further downstream at Fort Leavenworth, where the bulk of the post is atop the bluff, the river broke the dike protecting the army's Sherman Airfield. While the field was completely inundated most movable property had been taken to safe storage in higher areas. Despite this, direct and indirect damage reached $346,000. The Missouri Valley Steel Company in the town of Leavenworth was not as lucky. There considerable damage was

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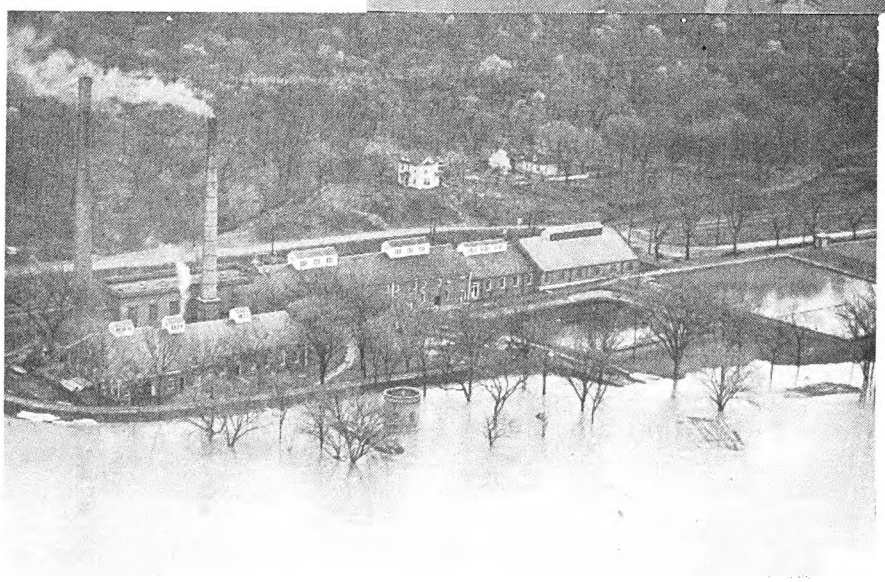
St. Joseph's Rosecrans Airport suffered massive damage during the 1952 flood.



An emergency levee saved the St. Joseph Waterworks from the Missouri's high water.

done to boats under construction for the Corps of Engineers. As the crest moved downstream toward Kansas City, concern increased because of fear that the levees and floodwalls damaged the previous year would not withstand the new crest. Under these circumstances the District had to undertake the dual duties of flood fighting and confidence building.

In the Fairfax district, repairs to the 1951 damage were incomplete when the new emergency arose. The Corps quickly obtained local construction assistance to build an emergency "tie-back" levee around Jersey Creek and raised the Missouri River levee by means of a temporary "flash board." Despite these efforts, the management of most Fairfax companies directed their employees to remove valuable property and make plants as flood-proof as possible. When the crest approached, the "flood shy" managers closed down completly. For eight days, the area stood stock still with only flood watch activities to break the quiet. When the crest passed, indirect

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Workmen push dirt behind a "flash board" on the Jersey Creek levee. Such structures provided temporary increases in the height of a dike without the expense of permanent construction.

losses because of business closings totalled almost nine million dollars even though the district was safe throughout the entire period.

The area across the river was not as lucky. A break in the Quindaro levee allowed water to back up a creek into Riverside, Missouri, and in spite of an emergency levee water overtopped a floodwall doing almost one million dollars worth of damage. In other parts of the metropolitan area literally no direct flood damage occurred, although businesses sustained sizable losses by closing, and post-flood bank restoration cost the Federal government over $800,000. From Kansas City to the mouth of the river, urban damage continued quite low. In contrast, rural areas and agricultural land suffered heavily. Over one-half million acres in Missouri were inundated at a total loss of more than $46,000,000. In addition numerous bridges were closed to traffic. In fact, every bridge from Kansas City to Rulo was out of service as well as many crossing the Missouri downstream. One of the high points of flood control during the crisis involved the success of several agricultural levees below Rulo and Atchison that had been authorized by the Pick-Sloan legislation. The seven completed levee units along the reach protected 47,000 acres, preventing an estimated damage of $2,321,000. June of 1952 had been a busy time for the Kansas City District, yet its overall success in the fight against the flood gave the engineers something to be proud of.

While heavy snow had fallen on the northern portions of the Missouri basin, a drought had been developing in the midwest. The reduction in precipitation played a major part in holding down the flood crest in the lower Missouri in 1952 and would continue to limit flows for several years. During 1953 rainfall in many parts of Kansas and Nebraska was only 30 to 40 percent of normal, although Missouri reached close to 70 percent of its average. Under these circumstances, it was ironic that the most serious flood of the year took place in north central Kansas on Prairie Dog Creek. There a downpour sent the stream on a rampage that ultimately did more than $1,750,000 worth of damage before the water was collected behind the Harlan County Dam. This flood was typical of high water during the drought years; brief but costly crises could occur in local areas where flood controls were limited or nonexistent. In 1954 and '55 even the flash floods declined and the District reported a continuing low level of flood damage. By 1956, the drought had sent

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many rivers and streams to record lows as well as drying up numerous ponds and wells. The Corps' major problem remained the flash flood that would follow a severe thunderstorm. Again, these were highly localized and presented no overall challenge to the District.

The middle western drought generally ended during 1957 and with its end came an increase in flooding of agricultural lowlands. For the next several years, Kansas and Nebraska rivers occasionally reached flood levels. One of the more freakish flash floods of the period occurred at St. Joseph on May 18, 1959, when a conduit carrying Blacksnake Creek through a suburban neighborhood became clogged and sent a body of water roaring down a three block wide section of town, doing about $400,000 damage. When the decade ended, the overall flood control program had reached a point that permitted the following statement: "During June-July [1960], the upper Missouri River reservoirs, supported by operating units of the agricultural levee system and by existing Kansas Basin reservoirs, accomplished substantial flood reductions."[12] The emerging system was further taming the mighty Missouri.

As the weather cycle moved back toward an extremely wet phase in the early 1960's, the District was faced with an increasing number of floods. May 1961, saw a moderate flood on the Osage that culminated in over $130,000 damage to resorts on the Lake of the Ozarks. Although the Corps could do little about local flooding, its detailed record-keeping was helpful for long range planning of additional flood control works. A good example of this involved the Little Platte River in Missouri. In 1964 the town of Smithville, Missouri, received over $500,000 damage in a June flood and in 1965, high water did almost $3 million worth of destruction. Congress used this evidence when it authorized a dam on the Little Platte.

While the District had continued to maintain flood plans over the less crucial years, there had been little need to implement them.

12. Report on Flood-Fighting, Rescue, and Rehabilitation in the Kansas City District during 1960, p. 4.

In May of 1961, the confluence of the Missouri and Osage rivers looked more like a lake as the Osage dumped its flood-swollen discharge into the larger river.

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The damage shown above followed the Little Platte River's 1965 flood. Smithville was especially vulnerable to flash floods because of steepness of the Little Platte valley.

This came to an end in 1967 when conditions on the main stem of the Missouri River were reminiscent of 1951. As the June rise joined with heavy rain the Missouri rose to flood stage throughout the District. Vast quantities of low lying agricultural lands were covered, causing the highest losses since 1951. Yet the Kansas City District could report that "a combination of reservoirs, local protection projects, and Missouri River levees prevented an estimated $554,467,000 in damages." As witness to this, agricultural damage was set at $48,583,500, while all rural and urban property losses only totalled $51,800. The total cost of the flood would have to include damage to levees, transportation, and utilities, estimated at nearly $3,000,000. Yet what could have gone down as the "great flood of '67" was for the most part avoided.

During the late 1960's and early 1970's District reports on floods more and more related the effect of flood control works on crests. By 1970 a system of charting the percentage effect on lowering crests was introduced into the yearly flood reports. Clearly, floods and flood control had reached a close working relationship. The District still provided detailed reports on localized flash floods, but coordination of the system had become more important. No one could be absolutely certain that another "100 year flood" would not do massive damage. However, the incomplete system had been tested and not found wanting. When another great crisis arose all that could be hoped for was that more protection would be available and that specific emergencies would be met successfully. The danger of a super-flood had not been eliminated; it had clearly been lessened.

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CHAPTER III: Flood Control

Of all the activities undertaken by the Corps of Engineers, none is more complicated and controversial than flood control. The expenditure of vast sums of money is necessary if economic development is to take place on the flood plain of the Missouri River and its tributaries. Yet, this spending must be justified by showing that the cost of protection is less than projected flood damage. Further, arguments develop over where flood control should begin. Small dams on tributaries vie with larger main stem reservoirs, while high levees forcing the river into a narrow channel contest with low dikes set well back in the floodway. Ecological considerations often appear when a dam will inundate a wildlife preserve or valuable cropland. Since flood protection automatically increases the value of any area, arguments arise over who should pay for the protection. In the long history of man's attempt to live near major waterways the struggle with the destructive nature of too much water remains a never ending one.

In the early years of settlement along the Missouri, flood control was almost totally a local affair, with private groups often constructing a levee to protect their property. Frequently, railroads would build dikes around bridge abutments to prevent washing-out during high water. Public involvement occurred when cities authorized the building of levees to keep flood waters from low lying sections of towns. Work of this type was expensive and thus the total area protected was rather small. However, as cities grew and became industrialized the possible loss from a flood increased dramatically. Still, the Federal government did not consider flood control a suitable area for its action.

In the years after the great flood of 1903, a change began to occur. States in the Missouri River basin provided legislation for the creation of drainage districts that would build flood protection in specific areas. In 1906, the Kaw Valley Drainage District was created to fight floods in the region of the lower Kansas River. The next year saw the creation of the Kansas City District and the beginning of a long period of "local cooperation." For a while local groups would request assistance from the Corps on a project-by-project basis. Negotiation would take place between the Secretary of War and a drainage board and if a satisfactory arrangement could be made the District Engineer was ordered to do the government part of the project. In order to simplify this procedure the River and Harbor Act of 1915 laid out general regulations for "local cooperation." The terms as spelled out by the Secretary of War called for cooperation on the basis of shared costs with the local group contributing 75 percent and the Federal government 25 percent. Although the basic aim of cooperation was to improve navigation, a few projects involved flood control. Obviously the Federal government's role in flood control was still evolving and the move toward shared responsibility was an example of one direction it could take. Another tack came in 1917, when Congress passed a specific act "for the control of floods" on the Mississippi and Sacramento rivers.

During the 'teens, a great deal of work had been done to obtain a six-foot channel from Kansas City to the mouth of the river. This had involved bank stabilization and alignment that often narrowed the overall width of the stream. While this procedure created a more usable river, it also opened the way to building on bottom land reclaimed from the meandering stream. Obviously, anything constructed here was susceptible to flooding. The high water in 1915 showed the vulnerability of flood plain construction, convincing many people that something needed to be done. Unfortunately, World War I soon absorbed the energies of the Corps of Engineers and neither navigation nor flood control received much attention for several years. When peace returned, it brought entirely new national priorities which did not include development of the Missouri River. As noted in the discussion on navigation, the District did not even have enough funds during 1922 to continue maintenance, much less start new work on the six-foot channel or flood control projects.

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Even though it appeared that the Federal government was not interested in new river projects, it was extremely concerned about energy sources for the nation's developing industry. A Federal Power Commission had been created early in the decade to regulate the use of waterpower sites but found that the information at its disposal was meager indeed. To solve the problem Congress added the following section to the River and Harbor Act of 1925:

> The Secretary of War, through the Corps of Engineers of the United States Army, and the Federal Power Commission are jointly hereby authorized and directed to prepare and submit to Congress an estimate of the cost of making such examinations, surveys, or other investigations as, in their opinion, may be required of those navigable streams of the United States, and their tributaries, whereon power development appears feasible and practicable, with a view to the formulation of general plans for the most effective improvement of such streams for the purposes of navigation and the prosecution of such improvement in combination with the most efficient development of the potential water power, the control of floods, and the needs of irrigation; **Provided**, That no consideration of the Colorado River and its problems shall be included in the consideration or estimate provided herein.

Although flood control was obviously not to be the major objective of the proposed study, the subject had been brought up. The response came in 1926 as House Document "308." Actually little was done until 1928 when Congress appropriated funds to carry out the review after the disastrous Mississippi River flood of 1927. In fact, the River and Harbor Act of 1928 specifically called for the Corps "to prepare and submit to Congress at the earliest practicable date projects for flood control on all tributary streams of the Mississippi River system subject to destructive floods . . . ." Reference was again made to "308" but clearly the studies would now focus on flood control, not power.

In response to the congressional directive, the Kansas City District started its study of the entire Missouri River basin. On the one hand, detailed engineering studies were made of all aspects of the river's behavior, while on the other public meetings were held to obtain the opinions of interested local parties. On August 14, 1930, the District Engineer, Lt. Col. Richard C. Moore, conducted a hearing at Topeka, Kansas. After Colonel Moore had explained the nature of the hearing he asked for ideas of the participants. The first person to speak was Congressman U. S. Guyer. His work in Washington was indicative of the growing interest in flood control.

> The Flood Control Committee, to which I have the honor of belonging was formed to take care of the flood situation in the United States. It never functioned to any great degree until after 1927. The Flood Control Committee then became a most important part of the United States, because the subject of flood control had become interesting to so many communities of the country, the idea of national studies on flood control was brought out, and that is why we are here today. After four months of hearings before our Committee, everyone thinking their complaint, their damages were the worst, we felt somewhat like the resident of Johnstown, who lost his life in that memorable flood, and when he went above he was telling about the terrors of that terrible sweep of waters, and just when he reached his climax an old fellow he had been standing near turned away, and sneeringly remarked, 'O! Hell, you don't know what a flood is!' The Johnstown man didn't like that at all, belittling such a flood as he had been through, and he went to St. Peter and said, 'Who is that old guy who came around and spoiled my story?' and he pointed him out, and St. Peter said, 'O! that is Noah.'[1]

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1. Transcript of Proceeding of Hearings Held at Topeka, Kansas, on August 14, 1930 in Connection with Studies under H. D. 308 and Section 10 of the Flood Control Act of 1928 (Typewritten), pp. 21-22. Colonel Moore ultimately became a major general serving as Deputy Chief of Staff of the U.S. Army under General George C. Marshall.

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This hearing, like many others held at the time, covered almost every aspect of water usage. Some observers called for effective flood control projects to be accomplished in any way possible. Others discussed the need for upstream reservoirs that would provide irrigation as well as flood control. In a few instances concern was expressed over interference with interstate streams, since one state's flood control might be another's drought. Even navigation topics arose—one person called for a six-foot channel on the Kansas River from the mouth to Topeka to take advantage of Missouri River traffic. Clearly, the Kansas City District was able to record a broad spectrum of opinion at its hearings.

The massive task of compiling the report was finally completed in the autumn of 1932. Even though the District Engineer had to ask for an extension of the due date, the final product was worth the additional time. Published as House Document 238 of the 73rd Congress, 2nd Session, it dealt with literally every aspect of the whole Missouri River basin. Its eighteen page table of contents ran the gamut from "Physical and economic" descriptions to detailed plans for flood control. Whatever Congress decided to authorize, there was little doubt that the Kansas City District had produced sufficient information on which to base its conclusions.

In its final form the report on the Missouri River was basically the work of Capt. Theodore Wyman, Jr., the District Engineer from October, 1930, until January, 1934. Captain Wyman took an extremely conscientious view of how the government's money should be spent. He carefully calculated the estimated construction costs and weighed them against damage to be prevented. Again and again he concluded that proposed flood control works were not—by his cost accounting—"economic." His view of flood protection on the Missouri River was simply stated: "(a) channel straightening; (b) bypass floodways; (c) storage or detention reservoirs on the main stem; (d) levees; (e) a combination of two or more of these." Wyman then proceeded to eliminate the first as impossible, given the Missouri's disposition to meander; the second as far too expensive; and the third as impractical for protection on the lower river. This left only levees as a logical guard against high water. However, given the nature of the valley most rural levees would cost more than could be justified. For the Kansas City area he developed a detailed levee program that included widening the flood plain by setting back the dikes on the north side of the river and other specific projects to obtain a flow of 625,000 cubic feet per second past the city. Wyman concluded the cost would be over $6,500,000 but that savings from predicted flooding would be slightly more. The Captain felt obliged to reflect on his conservative view of the economic growth of the area: "The future development and perfection of air, rail, and water transportation will, no doubt, greatly increase the value of this area of the flood plain far beyond the 30 percent increase assumed in the economic set-up. The future occurrence of a flood equal to or greater than

This photograph shows Theodore Wyman as a colonel. When he served as Kansas City District Engineer, his rank was captain. Wyman's flood control proposals in the early 1930's set the stage for much future work.

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that of 1903 is a certainty. The dire consequences of such an occurrence make the estimated cost ($6,542,450) seem small by comparison."[2]

While Captain Wyman discussed tributary reservoirs as part of municipal flood control, his cost consciousness remained acute. A reservoir near Kanopolis, Kansas on the Smoky Hill River would reduce flood stages at Salina; however, the cost was too great for the protection afforded and it was not recommended. In total only fourteen reservoirs on tributaries that entered the Missouri south of Rulo, Nebraska (the soon to be established upstream limit of the Kansas City District) were suggested. As he refined the recommendations the District Engineer limited his proposal to only three tributary dams: at Arlington on the Gasconade, Chillicothe on the Grand, and Topeka on the Kansas. In addition, Fort Peck dam was to be the most important main stem reservoir, although its effect would be mitigated by storms below the dam site. Using Kansas City as an example, the Captain estimated that Fort Peck would have reduced the 1903 flood by 17,500 second-feet and Topeka would have taken 166,800 second-feet off the same flood on the Kansas River. Together these reservoirs would have reduced the flow at Kansas City by 184,300 second-feet, dropping the river to a much less dangerous level. In summary, Captain Wyman's proposals were simple and conservative: combine flood control works in urban areas with a modest reservoir system. Rural areas and smaller cities could not be protected at a reasonable cost.

As his report on the Missouri River moved through channels, Captain Wyman turned his attention to a detailed study of the Kansas River valley. In this study the District Engineer considered in great detail the Topeka reservoir included in the overall flood prevention proposal. No doubt he was influenced in his thinking by the Chief of Engineers and the Board of Engineers for Rivers and Harbors, both of whom indicated that the reservoir system could not "be economically justified."[3] Clearly the Captain believed the reservoir would be of great benefit in controlling Kansas River floods; just as obviously he knew that economic factors precluded its construction. Thus he touted its advantages while indicating "that the agricultural lands and municipalities located in the Kansas basin below the reservoir site could economically contribute only about one-third the cost of the reservoir." The Division Engineer noted in his comments that "local authorities [should] assume all flowage costs pertaining to flooding of towns and agricultural lands within the reservoir as their contribution to the project." One of the Corps' major considerations—construction cost in relation to the value of property protected—had become a stumbling block for the reservoir system.[4] The economic factors, plus local opposition that seemed well organized and politically powerful, doomed Topeka from the start.

On a more positive note, the flood control works for Topeka and Lawrence, Kansas, that were detailed in the Kansas River report became the basis of a project that would be authorized by Congress in 1936. In Topeka, additional levees would be constructed to protect North Topeka as well as a flood wall around the city's waterworks and enlarged waterways under existing bridges. In Lawrence, about four miles of levee would encircle North Lawrence to make it secure from high water on the Kansas River.

This easy progress from proposal to project was not to be the case for Kansas City. The report proposed higher levees in this area in lieu of the Topeka reservoir, but the cost of raising bridges, railroad levels, and numerous other structures immediately created opposition. For many months a debate ensued in the press, at hearings on the project, and through correspondence with the District offices. Kansas interests denounced the

2. U.S. Congress, House of Representatives, House Document No. 238, 73rd Congress, 2nd Session, 1935, p. 123. Captain Wyman would be District Engineer of the Honolulu District when World War II broke out. See Ellen van Hoften, **History of the Honolulu Engineer District, 1905-1965** (Honolulu: U.S. Army Engineer District, 1970), Chapter VI.

3. **Ibid.**, p. 2, 17.

4. U.S. Congress, House of Representatives, House Document No. 195, 73rd Congress, 2nd Session, 1932, p. 135.

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Topeka dam proposal because of its cost (estimated at $60 million) and because of its inundation of vast areas of fertile land. Industrial and transportation groups in the Kansas City area stated that a flood would be cheaper than the proposed protection. Under these circumstances it became necessary to find some way to generate cooperation rather than disharmony.

Assistance came just in the nick of time from an unusual source: the Mississippi Valley Committee of the National Resources Board. This Washington, D.C. agency apparently made its suggestion that a Joint Committee on Flood Protection be organized after the political pressures over the Topeka dam reached President Franklin D. Roosevelt. Although the new group would be composed of members of local Chambers of Commerce, the District was to assist with additional surveys to be financed by an emergency allotment of $25,000 from the War Department. In fact the Committee's report included an acknowledgment that Captain Wyman and other members of the District assisted in compiling the work. The Committee's final recommendation indicated its origin:

> In view of the serious and apparently insurmountable disadvantages of the Local High Levee plan, and the recognition that some measure of additional flood protection is needed, further investigation should be made of the possibility of providing flood protection for the Kansas Citys by retarding the floodwaters in the Kansas River basin without the objectionable features of the Local High Levee plan.[5]

Although the Committee's work was reasoned and unimpassioned it did not solve the basic problem of how to protect the metropolitan area from floods. In an effort to bolster its case the group engaged the services of nationally recognized civil engineer, F.H. Fowler, to make a study of the best method to control the Kansas and Missouri rivers in the Kansas City area. Obtaining a great deal of assistance from the District Office, Fowler concluded that upstream reservoirs augmented with local works would be the best means of providing adequate protection from floods. The Committee received the report in early 1937 and quickly approved it.

The fact that the debate over exactly how to protect the area continued did not mean that everything else stood still. Several local projects moved ahead. The City expanded the airport levee north of the river at no cost to the Corps and the Kansas Valley Drainage District engaged in several levee projects funded by Federal relief funds. As this construction went forward the Congress passed a major Flood Control Act on June 22, 1936, which included $10,000,000 for "levees and flood walls to protect the people and city property" in the Kansas City metropolitan region. This landmark legislation spelled out national policy on flood control for the first time including the separation of authority between the War and Agriculture Departments. The former would concern itself with the waterways themselves while the latter would attend to run-off, soil erosion, and waterflow retardation. Now a plan for the Kansas Citys was badly needed.

During the rest of the summer the recently appointed District Engineer, Lt. Col. P.A. Hodgson, completed a flood protection plan. It did not propose the expensive high levee so opposed by local interests, but rather called for some additional height on levees, setting back levees to increase the floodway, and raising bridges either permanently or temporarily by jacks during floods. The grand total came to $9,956,780 for construction and $6,640,578 for land and damages. Since this was far above the total $10,000,000 appropriation, Colonel Hodgson made an "Alternate Proposal" to carry out the general plan in just two districts–the Central Industrial and Armourdale–for slightly less than $12,000,000. For both the large and smaller proposals the District Engineer indicated that local cooperation was in no way assured.

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5. A Survey of the Economic Aspects of Flood Protection on the Kansas and Missouri Rivers in the Kansas City District, Submitted by the Missouri Valley Committee of the National Resources Board, Washington, D. C. (Joint Committee on Flood Protection of the Chamber of Commerce of Kansas City, Missouri, and Kansas City, Kansas, Chamber of Commerce, Oct. 1934), p. 54.

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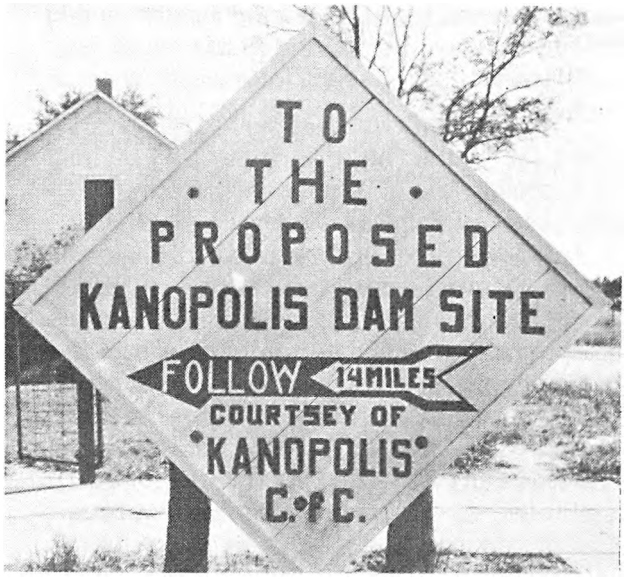
Public hearings had not won Kansas Citians to even a modified "high levee."[6]

Despite the approval of Congress and the available funds, it was obvious that no comprehensive project could be started without causing a great deal of hard feelings and possibly a long, involved law suit. Therefore, Colonel Hodgson turned his attention to the broad study of reservoirs. In April of 1937 he held hearings in Salina, Manhattan, and Topeka to gather preliminary information from local residents. The District Engineer noted the general nature of his work. "We regret that we have not a specific project on the part of the War Department to offer you. We have been unable as yet to get together sufficient data to allow us to make a specific proposal. In general, the project we have in mind consists of the construction of a number of reservoirs, supplemented in places where may be necessary by levees and flood wall."[7] Thus, beyond vague agreement that floods should be controlled at somebody's expense, little could be accomplished.

As the various studies on possible damsites and their downstream effect on flooding continued, public opinion tended to be sympathetic to tributary rather than main stem dams. Thus, the 1938 Flood Control Act approved, in principle, projects on five Kansas River tributaries; the Republican, Smoky Hill, Saline, Salmon, and Blue could all be controlled. The project that the District Engineer had said was not yet in existence was rapidly evolving. The first damsite selected under the 1938 legislation was the Smoky Hill River near Kanopolis, Kansas. During early 1939 preliminary surveys were conducted as the Kansas City District prepared to construct its initial major flood control dam.

Plans for the Kanopolis dam were made in a kind of informational vacuum. Flood control dams were new for the Corps as well as the people of the District. Dam opponents'



Local interest in the Kanopolis Dam was indicated by the direction signs erected by the local Chamber of Commerce. Although somewhat rustic, the way to the damsite was clear.

statements that the loss of good cropland and the taxes brought in could never be compensated for were seconded by others who felt the government was going beyond its normal role. However, the Kanopolis project seemed to have sizable local support. The Ellsworth Messenger provided good coverage, and while noting the opposition of farmer W.J. Loder, whose farm would be taken for the damsite, it generally talked of the advantages of new jobs, increased industry, expanded recreation, and flood control. One rather humorous front page piece indicated the mixture of feelings.

> With a big lake in the offing, Ellsworth's naval fraternity has already begun to make plans for the building of suitable ocean-going craft. The Boy Scout organization is considering a troop of Sea Scouts, and the Boys' Aviation Club, which has built such fine planes, will no doubt turn their attention to the building of motor boats.
>
> Landlubbers whose life on the ocean wave has been limited to a canoe or rowboat now have visions of a gasoline launch, a sailing yacht or a seven-masted sloop. The sporting fraternity already has an ambition to bring the next regatta for America's cup to Lake Smoky-ha-ha in Ellsworth county, Kansas, so that the

6. Project for Flood Control, File 7402 (Flood Control), Doc. 163, Oct. 31, 1936 (Files are in the District Holding Center), Kansas City Star, Sept. 21, 1936.
7. Public Hearings, Preliminary Report on Flood Control in Smoky Hill River Basin, File 7402 (Flood Control) Doc. 180, Apr. 23, 1937.

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funeral dirge of the Bloody British challenger may be sung to the tune of "Home on the Range."

A cowhand who has spent forty years in the saddle on the ranges of Empire township has no grudge in the proposed change of landscape. When approached for an opinion he said: 'If the sissies downstream insist on the government spending millions of dollars to prevent the Smoky messing up a dime's worth of geraniums in their alleged parks, it's all right with me; I've rode the range since I was a boy and I'll keep on riding it the rest of my life—if not in the saddle, then I'll use a boat.' He is in the market for a streamlined cutter with a 12-cylinder motor; he will have his lariat in the bow and the mudscow that gets in his path will very likely go to the bottom of the briny deep.

A younger cow-puncher sees an opportunity to satisfy a twenty-year longing. He swallowed the spray for a year on a submarine-chaser in the World War and he expressed himself thusly: 'I'm not much of a financier and am too dumb to figure how a 500-acre mud puddle is going to compensate for the loss of 24,000 acres from the tax rolls, but just the same, part of my farm sale money will go into a square-rigged seagoing vessel. I've done my bit in eating salt on the surface at fifty miles an hour. This time I will have a forty-foot mainmast and will sit on the mizzenmast stay on the starboard side where I can enjoy the salt breeze, and maybe see the tops of these beautiful old cottonwood trees'.[8]

In a slightly more serious vein, local leaders did fear that the lake would be empty except when being used for flood control. A request went to United States Representative Frank Carlson to find out what the Corps of Engineers proposed to do. The Congressman's answer heartened those who favored a permanent lake. He wrote that while plans were not complete, it appeared that a reservoir of approximately 1600 acres would exist at all times. This meant that recreation could become a major industry in the Ellsworth area. The local Chamber of Commerce and newspapers heaped lavish praise on Representative Carlson when the project received final approval and the Corps set a fall 1939 starting date.

On June 30, 1939, the District Engineer's annual report referred to Kanopolis: "Actual construction has not been started. Detailed plans are essentially completed." Of more long range importance was his statement concerning the overall proposal of the Flood Control Act of 1938. In addition to the Kansas River tributaries in the District, the Osage, Pomme de Terre, Grand, and Gasconade all were included in the comprehensive plan to be implemented by the Secretary of War and the Chief of Engineers. The District Engineer's statement that "no operations are proposed during the fiscal years 1940 and 1941" would become a classic understatement in light of the priority change that would occur with the outbreak of World War II.

Even with more and more diversion of Corps of Engineer's energies toward war preparation, Kanopolis moved along rather well. By the summer of 1941 the dam approached 25 percent completion and within a year it reached 50 percent. Not until 1943 did Congress suspend construction, diverting most of the funds allocated to the project to other programs. Even so, the project had reached 65 percent completion. For the rest of the war little would be done at Kanopolis, but as soon as the conflict ended an important part of the flood control system could be quickly completed.

While the Kanopolis reservoir moved ahead the Kansas City project slowly took form. The high levee plan that had caused so much controversy remained on the shelf as the District improved one or two units at a time. No final detailed project appeared during the late 1930's and early 1940's. Rather, the Corps attempted to obtain "substantially complete flood protection" if Kansas River reservoirs were constructed. By 1939 general surveys had led to specific plans for the Fair-

8. Ellsworth (Kansas) **Messenger**, July 6, 1939.

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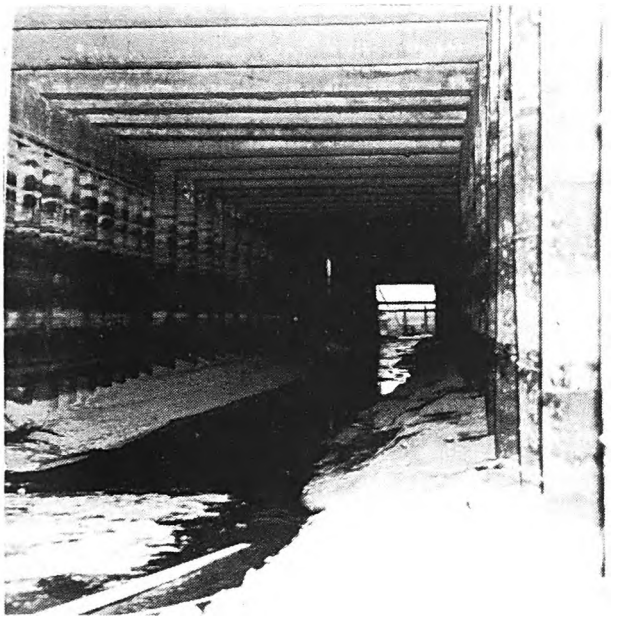

A view down the Jersey Creek box culvert. While this picture was taken after the 1951 flood, the structure was completed in 1941.

fax-Jersey Creek and Kansas River units with construction on the former begun in 1940 and the latter in 1941. During the next three years both projects were almost totally completed. This would be especially important since numerous war plants were constructed in the Fairfax District. In addition the James Street Bridge over the Kansas River was raised above projected flood levels. Plans were also drafted for the Central Industrial District, Armourdale, North Kansas City, other bridge alterations and floodway improvements on the Missouri River. The progress was impressive despite a drastic reduction of funds during the war. In fact, the appropriation for fiscal 1943 had been only $50,000; again, it was clear that total war and flood control were incompatible.

If flood control found itself short-changed by national defense, floods themselves did not face the same barrier. In both 1943 and 1944 disastrous flows roared down the Missouri River. As was often the case, crises like these led to quick and effective action. However, this time a war had to be fought and funds were not even available to repair dikes damaged by the water. There was the possibility that plans could be laid for the postwar period when public works might be needed to take up the slack in employment that would come with peace. Thus the House Flood Control Committee called the Missouri Division Engineer, Col. Lewis A. Pick, to testify before it shortly after the flood waters receded.

For Pick, the opportunity was indeed auspicious. The Colonel had long desired a broad based flood control and navigation project for the whole river and, as many observers concurred, had the political astuteness to convince Congress to authorize one. When the Committee approved a resolution calling for such a report, the Army's Chief of Engineers assigned the task to Pick—the Pick Plan was under way. In sharp contrast to many previous reports on the river basin, Pick's took only twelve pages. In simple, terse language he added three points to the 1938 plan: (1) construction of levees along the Missouri from Sioux City to the mouth, (2) building additional multipurpose dams on the main stem and certain tributaries and (3) construction of a diversion channel in the Dakotas to use main stem water for fighting droughts. Few pages described the project, but it would take many years to construct and would cost almost a billion dollars.[9]

Colonel Pick's efforts during the summer of 1943 had not been consumed with drafting the report. He spent most of his time making addresses throughout the valley publicizing and "selling" his proposal. He received a good deal of support from a recently organized group, the Missouri River States Committee, that understood full well the vast problems and expenses connected with harnessing the Missouri. Some observers would condemn Colonel Pick's approach as tending toward "grandstanding" rather than engineering; others, including Pick himself, would argue that the end justified the means. However, Pick's involvement was interrupted in October of 1943 when he was assigned to take over construction of the Ledo Road.

Just as the Pick Plan began to receive wide public attention the Bureau of Reclamation issued its own study of the Missouri basin.

9. U.S. Congress, House of Representatives, House Document No. 475, 78th Congress, 2nd Session, 1944, pp. 19-31.

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Under preparation for five years, it contrasted sharply with Pick's in both size and approach. In 209 pages it focused on irrigation and reclamation through a series of some ninety reservoirs.[10] The engineer in charge, William G. Sloan, worked from a premise of water conservation and called for dams that would provide enough water to irrigate nearly five million acres while providing hydroelectric power and some flood control. By mid-1944 Congress had two plans for the basin; they contrasted in many details, yet they were not mutually exclusive, as future events would prove.

Since the Bureau of Reclamation's plan appeared several months after the Corps', this agency had an opportunity to consider what the Army had said before completing its final draft. In general the Bureau grouped its projects into "areas of coordination" with the Army's plan, but it did note points of disagreement. Even though the two proposals had different aims, almost everyone felt they could be brought together. The Secretary of Interior, Harold Ickes, said as much when he transmitted the Sloan report to President Roosevelt, and both authors were willing to compromise if necessary. The late summer of 1944 saw the developments that would lead to "coordination."

President Roosevelt had long wanted Congress to create a Missouri Valley Authority to implement Missouri basin water-related goals. Private power interests opposed this as did many other anti-New Deal groups. When an MVA bill was introduced in the Senate on August 18, 1944, the battle lines were drawn. The next month Roosevelt forwarded a resolution of the Missouri River States Committee which asked for a single, coordinated plan to develop the whole Missouri valley. The Committee did not ask specifically for an MVA, but the President's covering letter did. Thus in short order opponents of MVA saw a combination of Pick's and Sloan's proposals as an alternative to the Authority. However, combining and enacting the two plans would not automatically eliminate the ultimate creation of an MVA. Therefore both friends and enemies of the President's proposal could support a compromise between the Bureau and the Corps.[11]

The details were hammered out at a mid-October meeting in Omaha. Since there would not be enough water for every proposal, some irrigation plans were scaled down. Still the agreement kept most of both reports. As one observer noted: "Every project in both plans was incorporated into the joint venture except the Army's proposed Oak Creek Dam in South Dakota, and it would have been included, too, if its site were not to be submerged by another dam in the joint plan."[12] Even with the evolution of the Pick-Sloan Plan a great deal of congressional politics remained. Pro- and anti-MVA forces jockeyed for position, introducing amendments that would cripple the Plan in order to force changes one side or the other wanted. Finally, the details were worked out and the Plan came to a vote in the Senate on December 12, 1944, without an MVA or any other important amendment. The development of the Missouri basin would take place under the joint jurisdiction of the Bureau and the Corps with a clearly defined program that included all major uses of the available water.

The Pick-Sloan Plan had not been part of the 1944 River and Harbor bill; rather it was included in legislation that made reference to public works, flood control, river and harbors, and "for other purposes." The River and Harbor bill had passed the House early in 1944 with the provision for a nine-foot channel on the Missouri from Sioux City to the mouth and numerous other projects in the basin. Since the Pick-Sloan Plan included these and more, there was no reason to leave them in the bill. In the confusion of the session's final day the House and Senate could not work out a revised bill and adjourned

10. U.S. Congress, Senate, Senate Document No. 191, 78th Congress, 2nd Session, 1944. The Report as transmitted to the Secretary of the Interior was entitled "Conservation, Control, and Use of the Water Resources of the Missouri River Basin."

11. Marian E. Ridgeway, **The Missouri Basin's Pick-Sloan Plan: A Case Study in Congressional Policy Determination** (Urbana: The University of Illinois Press, 1955), **passim.**

12. Rufus Terral, **The Missouri Valley: Land of Drought, Flood and Promise** (New Haven: Yale University Press, 1947), p. 234.

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without passing a river and harbor act.

Strangely, the newly elected Congress literally took up where the old one left off with river and harbor proposals. This time the duplications were removed and the bill passed late in February, 1945. Now the nine-foot channel joined the flood control aspects of Pick-Sloan, allowing work to begin on the comprehensive basin-wide plan. The earlier legislation had authorized $200,000,000 for both the Army and the Bureau of Reclamation to undertake the plan. The nine-foot channel would not be funded until six months after the war ended, but certainly a sizable appropriation would be forthcoming. The Corps could begin to formulate the overall plan that would include many important projects in the Kansas City District.

While there was no doubt that the Pick-Sloan Plan would increase the activities of the Kansas City District enormously, already existing legislation had given the District a sizable task. As World War II drew to a close the District Engineer reviewed past activities and estimated future needs. With great understatement he described the "existing project."

> . . .The general comprehensive plan for flood control and other purposes in the Missouri River Basin provides for levees along the Missouri River between Sioux City, Iowa, and the mouth and reservoirs located on the main stem of the Missouri River and on the tributaries for control of flood flows at the damsite. . . .[13]

All of this was based on the first general comprehensive act of 1938, modification enacted in 1941, and of course, the Pick-Sloan Plan of 1945. In addition to agricultural levees and urban flood control works, the District was now responsible for nine major reservoirs. When funds became available again the pace would increase dramatically.

One change made in the 1938 legislation involved an alternative reservoir on the Republican River. Originally this stream's discharge into the Kansas River was to be controlled by a dam near Milford, Kansas, only a few miles from the junction. However, this left the rest of the upstream area subject to flood and brought protests from residents of the Republican River valley. In 1940 Col. A.M. Neilson of the Kansas City office recommended moving the Republican River dam to Harlan County, Nebraska, and modifying the Tuttle Creek project on the Big Blue River near Manhattan, Kansas. These changes would provide additional flood control along the Republican without increasing the discharge of the Kansas River at Kansas City. The 1941 Flood Control Act authorized the change and by 1945 detailed plans for Harlan County reservoir were in preparation.

Although the new dam seemed well under way, changes in the Tuttle Creek reservoir were more difficult to accomplish. In fact, planning had already been deferred in order to study the possibility of alternate flood control methods on the Blue River. Opposition to this dam near Manhattan, Kansas, had been greater than any other (with the possible exception of Topeka). The Blue valley contained such rich soil that local residents argued that flood protection downstream could never approach the value of the inundated farm land. In addition, the historic nature of the area as well as its scenic beauty were cited as reasons to leave it alone.[14] So vocal was the opposition that no additional planning was done on Tuttle Creek until after the great flood of 1951.

Despite the delay on Tuttle Creek the Kansas City District had ample work during the early stages of Pick-Sloan. Reviving work on the Kanopolis reservoir, completing the project at Topeka, continuing the large-scale undertaking at Kansas City, and repairing damage done by the 1943 and 1944 Missouri River floods all had to receive attention. In addition, maps and plans had to be produced for the proposed agricultural levee from Rulo to the mouth. Finally, preliminary studies were under way for reservoirs on both the Osage and Gasconade rivers. Every member of the staff from the District Engineer, Lt. Col. Samuel G. Neff, on down to the lowliest

13. **Annual Report**, 1945, p. 1342.

14. Various letters to the District Engineer, File 7402 (Flood Control), Folder 23; transcript of a Public Hearing, April 7, 1937, is also in the same File.

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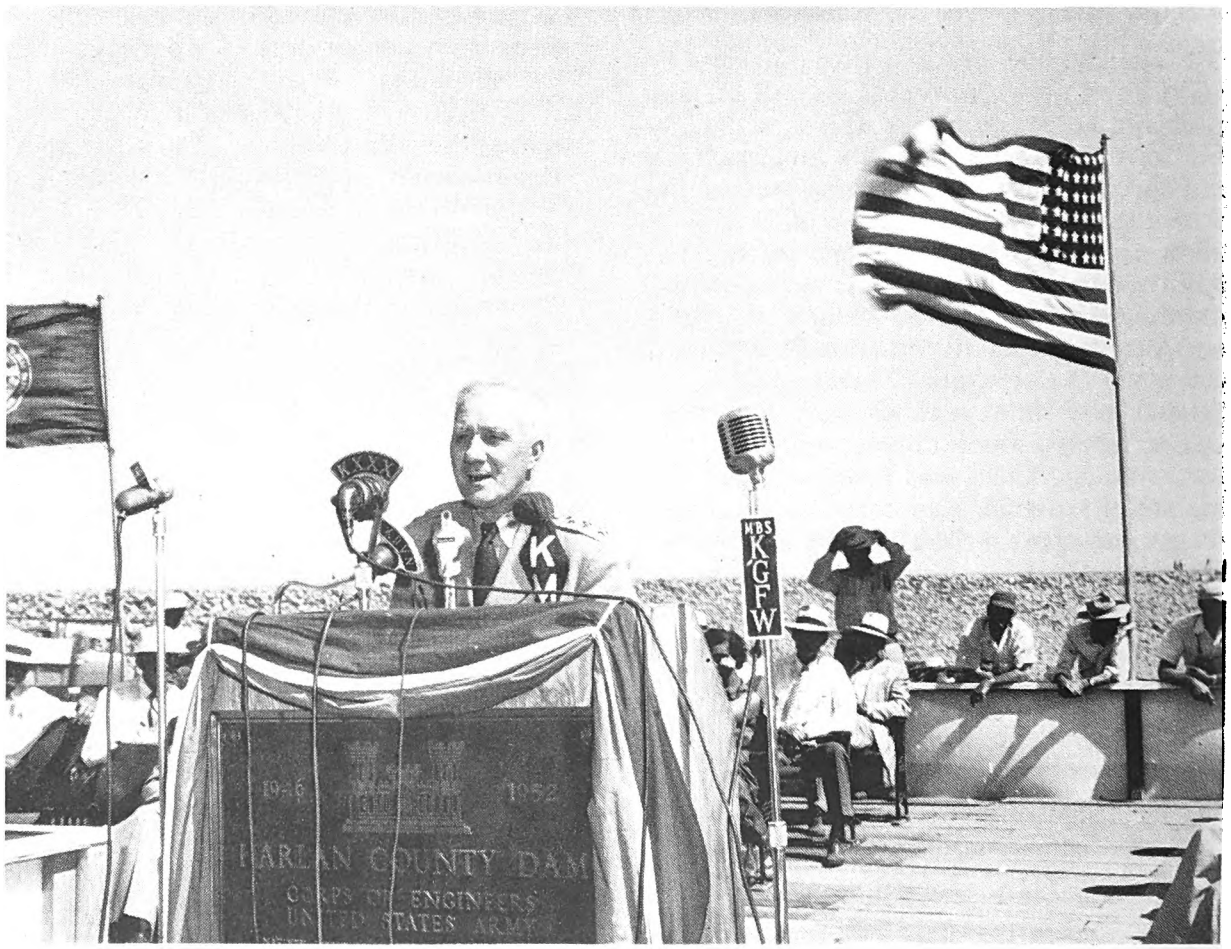

Major General Lewis Pick spoke at the dedication of the Harlan County Dam. General Pick enjoyed seeing the results of his many years of work.

"river rat" had his work cut out for him.

Congress, comprehending the magnitude of the Pick-Sloan Plan, authorized an additional $150,000,000 for the project in July of 1946. This would permit an even more rapid development of the overall plan. Appropriately, Brig. Gen. Lewis Pick had been reappointed Missouri Division Engineer in late 1945 (the earlier tour had been from April 1942 to October 1943) and would preside over the early implementation of his and Sloan's plan. A high point had come for the General in March, 1946, when he participated in the groundbreaking ceremonies for the expanded and improved flood control works in Kansas City's Central Industrial District. Since the event was billed as the official start of the Pick-Sloan Plan, a great deal of fanfare occurred. Specifically, the law of 1945 provided for protection of additional districts in the urban area as well as calling for several cut-offs downstream. The Kansas City, Missouri, Civic Band provided music while General Pick was joined on the speakers' stand by Governor M.Q. Sharpe of South Dakota, Governor Andrew F. Schoeppel of Kansas, Mayor John B. Gage of Kansas City, Missouri, and District Engineer Col. W.E. Potter of the Kansas City District. Many other District personnel who had helped draft the plan listened to the speeches along with an estimated crowd of 500. As General Pick described the various local improvements like higher floodwalls, broader floodways, and deeper channels, he related them to the reservoirs all over the basin that would ultimately make disastrous floods a thing of the past.

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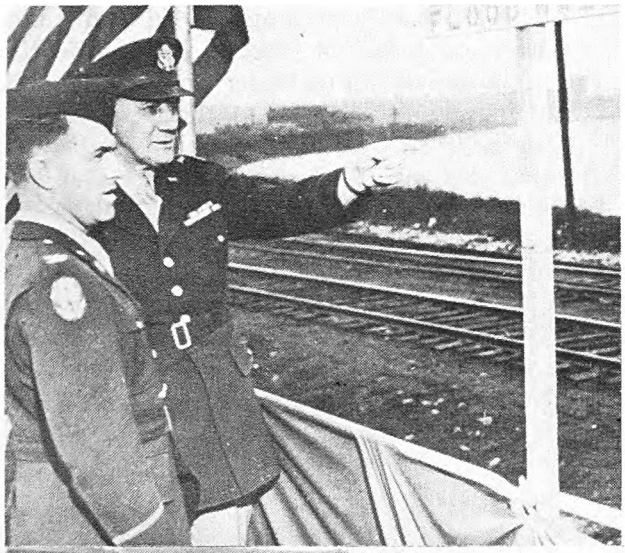
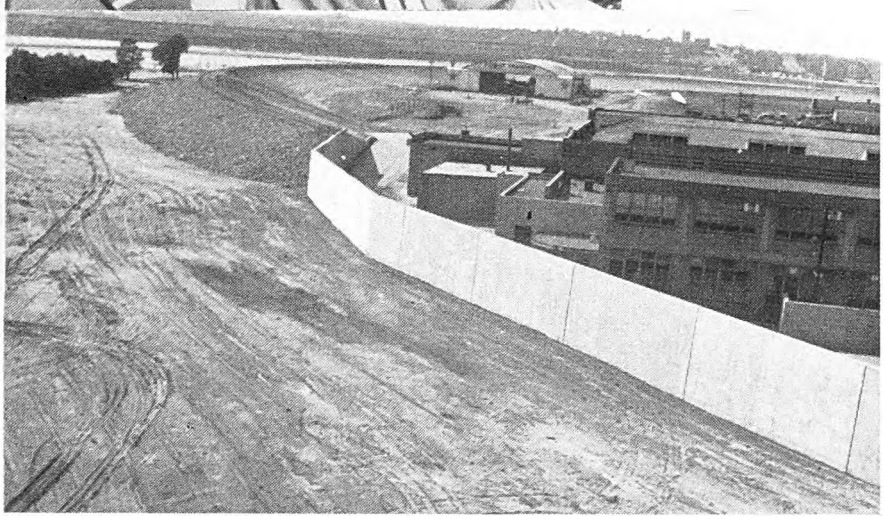


At the ground breaking ceremonies for the Central Industrial District flood control project. General Pick pointed out the height of the new floodwall to the Kansas City District Engineer, Colonel W.E. Potter.



A floodwall of the type General Pick described was constructed as part of the project around Kansas City's Municipal Airport.

During the first few years of the Pick-Sloan Plan a pattern emerged which indicated that constant modifications would be made in it, just as in previous proposals. Various factions still applied pressure for or against every project. While the Kanopolis dam was ready for use in May, 1948 and the Harlan County reservoir moved ahead rapidly, local opposition led to the suspension of work on the Osceola project on the Osage River. Again a good deal of the attack was based on the inundation of too much fertile farmland. A report compiled by various local, state, and Federal agencies about the Osage River basin called for an alternate site downstream, augmented by several small supplemental reservoirs on tributaries of the Osage. The end result was to delay for several more years effective flood control on the Osage River.

On a much brighter note the agricultural levees quickly started to emerge from the planning stage. The District office drafted detailed plans on specific units that would tie in with a bluff or high land at each end, making each project self contained. The unit was lettered L for left banks, R for right banks, and then numbered in relation to the river mileage from the mouth. Construction started on the first levee under the Pick-Sloan Plan in June 1948. It was L-488, near St. Joseph, Missouri, and was completed in 1955.

Tributary work first authorized under the Flood Control Act of 1941 and expanded by the Pick-Sloan Plan continued during the late 1940's. While minor from a spending standpoint, projects on the Republican River at Indianola, Nebraska, at the junction with

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Coon Creek, and a few miles downstream at Bartley would decrease flood damage by channel deepening and some levee construction. For both projects the Federal cost would be only $109,000, a small price to pay for the added protection in this part of Nebraska. A more expensive, but equally important, project was under way on the Chariton River in Missouri. Here numerous channel deepening and straightening operations would allow this flood-prone stream to carry its flow more quickly to the junction with the Missouri River near Glasgow. Projects on these various tributaries brought the overall flood control program closer to the people of the basin without creating the debate that always seemed to attend reservoir proposals.

One of the biggest events of the late 1940's was the completion of the Liberty Bend cut-off. This has been discussed in connection with navigation, but most of the justification for the project came under flood control. By eliminating the long loop the District Engineer believed that the flow past Kansas City could be increased dramatically. The long Liberty Bend slowed the Missouri's flow just as the narrow passage under the highway bridge on the Liberty-Independence road constricted it even more. The Kansas City office projected that the cut-off would change the action of the water so much that the bottom would be scoured out by more than a foot all the way up to the mouth of the Kansas River. This would be equivalent to adding a foot or more to every flood control project in the Kansas City area. In the years after completion it scoured even more river bottom and worked further upstream than expected.

This aerial view of the Chariton River shows clearly the channel straightening, as well as the numerous old "oxbows." When this photograph was taken, the stream was almost bankfull during a spring flood.

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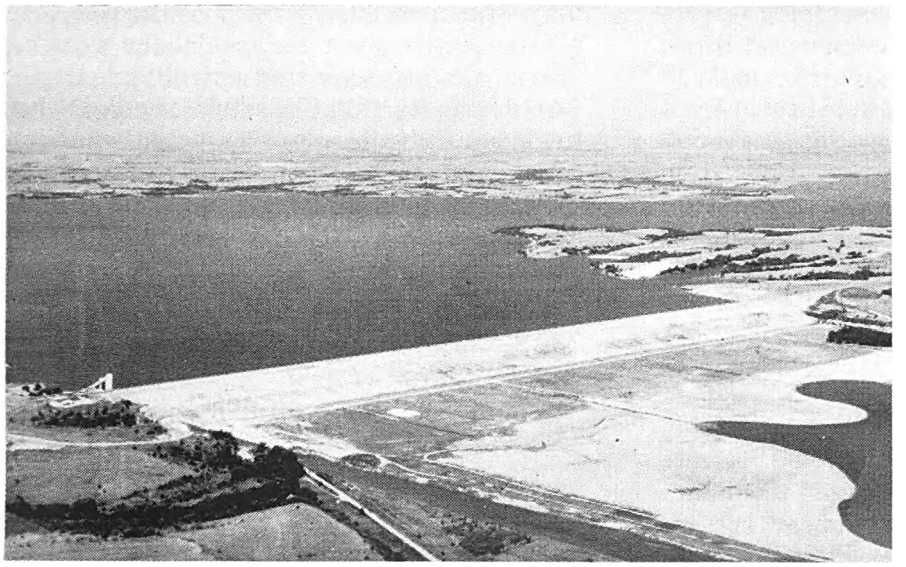

Milford Dam, once deleted, but finally approved and built, added additional flood control near the mouth of the Republican River.

The early 1950's again gave evidence of the evolving nature of the basin-wide flood protection plan. Congress authorized an additional $250,000,000 on May 17, 1950, while the Kansas City District continued its dual duties of overseeing construction and proposing modifications for the various Missouri River tributary reservoirs. During 1950, three proposals that had been developed by the District Engineer were published. All three would modify the existing Pick-Sloan Plan to a greater or lesser degree. Although it would take Congress until 1954 to approve even part of them, the new plans had a direct effect on already approved projects.

One of the most hotly debated aspects of the basin plan involved the Osage River in general and landowners as well as state officials who believed that the state of Missouri was being asked to give up too much land for flood control on the Mississippi River. The District Engineer followed the general advice of the broad based committee that had earlier suggested reservoirs on Osage River tributaries and a main stem dam somewhere downstream from Osceola. During his last weeks in Kansas City Col. W.E. Potter completed his comprehensive study and proposal for the Osage basin. After detailing the need to control this destructive stream he proposed a dam at Kaysinger Bluff (near Warsaw) as an alternate for Osceola as well as six additional tributary dams and another main stem reservoir at Melvern, Kansas, some 270 miles upstream from Warsaw. The Pomme de Terre dam on the tributary river of the same name was retained with the suggestion that water power facilities be added. Since four of the proposed dams would be in Kansas, the main stem of the Osage (called Marais de Cygnes west of the state line) would be well controlled and the rich farmland properly protected from floods. The two dams in Missouri would control tributaries which flowed into the Osage from the south. Full implementation of the plan also required flood works at Ottawa and Osawatamie, Kansas. As recommended, the plan would cost $178,286,000, a sizable sum, but well within the cost benefit ratio required to justify it.[15]

In a similar study on the Kansas River basin Colonel Potter carefully reviewed the objections to Tuttle Creek dam, giving serious consideration to the use of tributary reservoirs as an alternative. His conclusion was that the relation of cost to protection made Tuttle Creek the best possible choice. However, he

15. U.S. Congress, House of Representatives, House Document No. 549, 81st Congress, 2nd Session, 1950.

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proposed two additional dams: on the Republican at Milford and the Delaware near Perry, Kansas. Milford had been authorized in 1938 but Harlan County had been substituted for it in 1941. Colonel Potter argued that the 3,600 square mile watershed downstream from Harlan County reservoir posed a serious flood threat and thus recommended a flood control only reservoir at Milford. Local interest indicated that there was little opposition to this kind of project because only minor alterations to rail and highway facilities would be needed. The restoration of Milford was a good example of the evolving nature of overall flood control. Perry reservoir would increase flood protection for cities between the mouth of the Delaware and the junction of the Kansas River with the Missouri. Since Lawrence and the Kansas Citys were on this stretch its flood control role would be large indeed. In addition, its proximity to the Missouri would make it important for navigation when normal main stem flows were deficient. Finally, the report proposed local flood protection works at ten cities including Salina, Abilene, and Manhattan, as well as drainage and flow improvement on several minor tributary streams. The total estimated cost was to be $42,929,830, a figure well below the protection to be provided.[16]

A third report compiled under Colonel Potter's direction involved the Chariton River of Iowa and Missouri. A great deal of channel work had already been completed, yet floods were still a major problem. Thus a dam on the main stem near Rathbun, Iowa, and local flood works at several towns downstream were proposed. At $14,443,000 the Rathbun project would be one of the less expensive dams in the District, yet its impact on flood prevention for its own valley would average over $880,000 per year.

For quite some time after being received by Congress in 1950 little action was taken on these reports. The deferred status of Tuttle Creek ended with resumption of planning in 1951, but Congress did not authorize any of the other modifications. Needless to say, this did not mean the District was running short on work. The huge project at Kansas City continued at a rapid pace as did the work on Harlan County and the agricultural levees. The disastrous flood of 1951 showed what the Missouri basin occasionally had to undergo as well as bringing home the need for greater flood control work. The District Engineer reported:

> The Kansas Citys, Mo. and Kans., experienced the most damaging flood in their history. On the night of July 12 and July 13, 1951, the Kansas River rose rapidly and overtopped existing flood-protection works in the Argentine, Armourdale, and Central Industrial District, causing extensive damage to the levees, flood walls, and appurtenant works. Valiant flood-fighting efforts to prevent flooding of these units were made in vain, since the height of the protective works was predicated on control of flood flows by upstream reservoirs, of which only one was completed and in operation. On July 13, 1951, the Fairfax-Jersey Creek unit levee failed due to erosion of the landside by seepage under the Jersey Creek box culvert constructed prior to authorization of this project. A contract for strengthening the Jersey Creek sewer had been awarded only a few days prior to its failure.[17]

In the aftermath of the flood Congress appropriated funds for emergency repair, although no action was taken on the proposed changes. It must be remembered that the Korean conflict was going on at this time and the Federal government did not desire new commitments under the circumstances. After the truce in the Far East the Congress returned to more normal pursuits, passed a $217,710,000 authorization and modified the Pick-Sloan Plan in the Kansas City District in accordance with Colonel Potter's recommendations of several years before. Once again the District could carry out its dual role of overseeing the construction of authorized and funded projects while continuing to review and revise the overall plan. Even though local interests often strongly resisted

16. U.S. Congress, House of Representatives, House Document No. 642, 81st Congress, 2nd Session, 1950.

17. **Annual Report, 1952, p. 1265.**

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reservoir projects, the flood protection program did move forward. A major focus of the continuing controversy over flood control was the Kansas River basin. Following the 1951 flood the State of Kansas hired a Board of Engineers to review the Kansas River situation. The recommendations were diametrically opposed to plans of the Corps. The Board said a wider floodway and higher levees, without reservoirs, would contain urban floods. Rural areas, it continued, could not be protected economically in any case. Specifically it called for a halt in construction at Tuttle Creek and two Bureau of Reclamation dams in western Kansas. The report raised anew the whole issue of how best to protect property in time of high water. Broader flow-ways had been considered in the "308" hearings and rejected as a single solution. Now the Corps faced specific opposition while the residents of the Kansas River valley feared a long debate would leave them without protection. It soon became obvious that a long, drawn-out fight would leave the valley vulnerable to new flooding.

A solution started to emerge when a self appointed group of people representing the cities of the lower Kansas River formed the Kaw River Flood Committee. This group hoped for a "truce" between the Corps and the State Board so their cities would receive some protection. At the same time the Kansas City District was carrying out a counter attack on the Board's work in an "unofficial" way. A trade journal reported:

> Army engineers criticize the preliminary report on these main counts:
>
> • Flow-way plan gives no protection to rural areas in flood plain.
>
> • The report minimizes erroneously the flood damage to farms, highways, railroads, and other public utilities in rural areas.
>
> • Dumping Kansas River floods directly into the Missouri without any detention either would expose downstream lands to overflow or require expensive revision of protective works.
>
> • Costs cited are not realistic. Actually the currently planned system of 36 flood-control reservoirs and 21 local protection projects would cost about $700 million while the estimate of $200 million for the flow-ways appears too low.
>
> • The present basic plan would furnish protection in the Kansas River Valley for a greater potential flood than that of 1951, while the flow-way proposal assumes the 1951 flood as the standard for design.
>
> • Contention by the consultants that a comprehensive system of reservoirs cannot be operated successfully is disproved by experience in the Ohio River Basin and other great valleys.
>
> • The report fails to test its proposals on a basis of benefit-to-cost evaluation.
>
> • In assuming that the federal government would buy the needed real estate for the flow-ways, the report disregards national policy established by Congress.
>
> • In suggesting that present construction of reservoirs like Tuttle Creek, Kirwin and Webster be held up until all conflicts are settled, the report ignores the long delay that would occur in furnishing needed protection.
>
> What bothers the army engineers most is that revival of the discarded flow-way plan has confused the thinking of the people and their public officials in Kansas and elsewhere. If the report is not properly answered, they fear that flood protection in the Kansas River Valley and the entire Missouri Basin will suffer a severe set-back and serious delay.[18]

Yet there was another problem facing the Corps. In November of 1952 Dwight Eisenhower had been elected as the first Republican President in twenty years. Part of the campaign had been based on promises to reduce Federal spending. If the "cut-rate" plan seemed feasible, the newly elected Republican Congress might discard the whole Pick-Sloan Plan. Indeed, it was rumored that the Corps did not ask for additional funds for Tuttle Creek for fiscal 1954 so as to keep the issue out of the limelight.[19] District per-

18. **Engineering News-Record**, April 23, 1953, p. 26.
19. **Ibid.**, Jan. 28, 1954, p. 27.

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sonnel had continuing faith in the flood control program as it had been developed, but Congress, as usual, would have the last word.

In the long run the national political change did not curtail the Pick-Sloan Plan. Even the economy-minded Congress increased spending authorization without modifying the overall program in 1954. Funds for Tuttle Creek reappeared in the 1956 fiscal year budget, with work resuming in October of 1955. The views of the Kansas Board had not been accepted and pressure from urban leaders had assisted in reviving the reservoir approach to flood control. Still changes would occur, as in 1956 when Congress deleted a Bureau of Reclamation dam in northwest Kansas and added a Corps of Engineers dam on the Saline, upstream from Salina. The new project, Wilson dam, would work in conjunction with Kanopolis to protect the city.

During the latter 1950's the District moved through well-known steps to recommend to Congress, to receive authorization, to plan and finally to let contracts to construct a project. Since planning was an "in-house" activity, while construction was contracted, the Corps' techniques for reservoir development had reached a high degree of efficiency. By mid-1960 Kanopolis and Harlan County were completed and functioning. Tuttle Creek, despite the long delay and numerous conflicts, had reached 65 percent of completion. In fact it helped control the spring flood of 1960, cutting several feet off the crest of the Blue River at Manhattan. Pomona on the Marais des Cygnes-Osage River was under construction and approaching 20 percent completion. Pomme de Terre on the river of the same name in Missouri lacked only 40 percent of being finished. Planning was well along on Wilson and Perry while at an earlier stage at Stockton, Rathbun, and Kaysinger Bluff dams. In addition numerous local flood protection systems were under way on almost every major tributary in the District.

A growing awareness of national resources would affect the Corps in many ways during the 1960's. One in particular was the Water

A view of the rolling Ozark woodlands showing where the Pomme de Terre Dam was to be located.

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After completion of the dam, a whole new view appeared. Low spots became coves and higher land turned into "fingers" surrounded by the Pomme de Terre's blue waters.

Supply Act of 1958.[20] It stipulated that states could request additional storage in reservoirs for future municipal or industrial needs. The value of this supply could be used in the economic justification of a dam, but actual payment for the additional capacity would be borne by local interests after they started using the water. This legislation added a new dimension to the multipurpose reservoir, especially in regions where urban growth had made the need for long range water supplies critical. The State of Kansas quickly took advantage of the law, requesting additional storage at Perry Reservoir for urban needs. The District Engineer authorized the change and a new site for the dam was selected to provide greater capacity. Perry's proximity to the metropolitan area made this a logical place to inaugurate this new concept in the District.

By the end of the 1960's the flood control efforts of the Kansas City District were as massive as they were varied. A large number of dams were completed, requiring only maintenance and operation. Many more were under construction or in the planning stage. This meant conducting studies that ranged all the way from economic feasibility to subsoil quality to strength of materials. It also meant drafting contracts for construction companies that would do the actual work. In addition the real estate division had to carry on purchasing activities to provide space for the reservoirs as well as negotiating flowage ease-

20. Title III, Public Law 85-500, 85th Congress.

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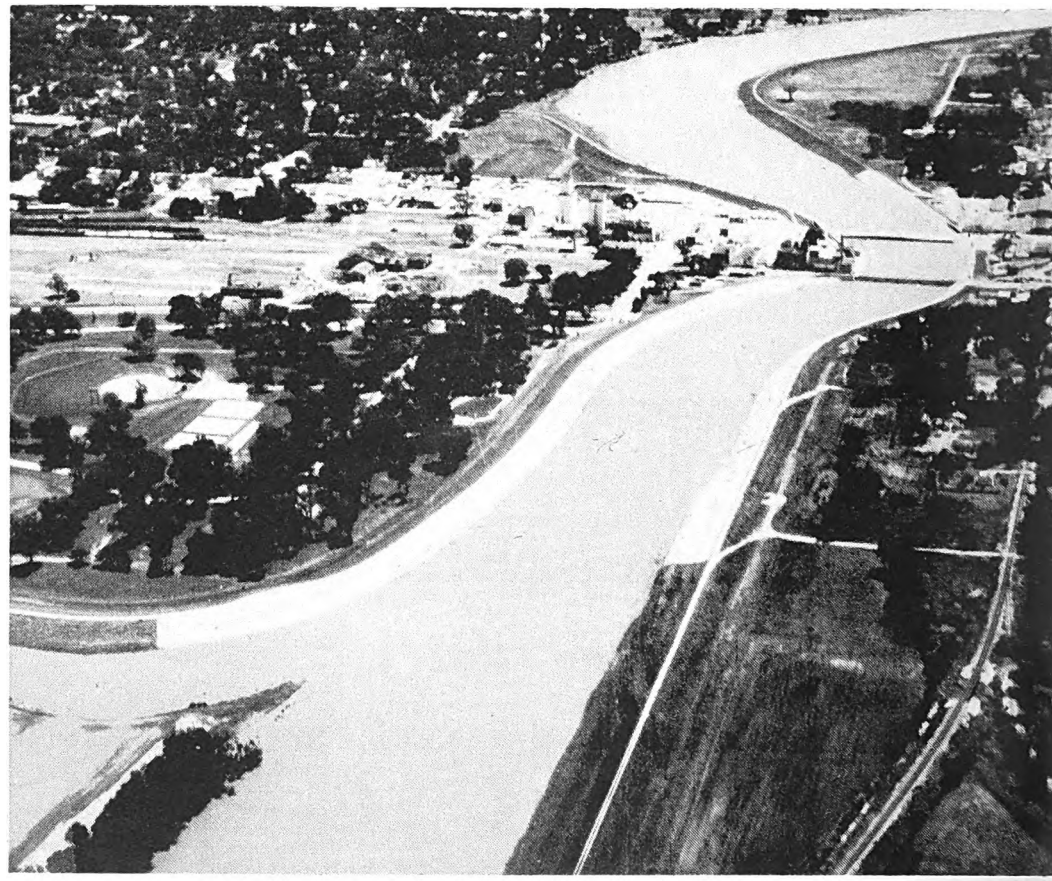
After a mid-1960's project, Ottawa, Kansas, received protection from the Marais Des Cygnes River through levees and other flood control improvements.



ments for the areas that would be flooded during full pool periods. In the 1970 Annual Report the District Engineer could list forty-two specific flood control projects that were completed or under active consideration by the Corps.

A few examples of the wide variation of projects and their import can best describe the District's scope. Local jobs such as the placing of White Clay Creek in a covered conduit through downtown Atchison, Kansas, and straightening channels or building levees at places like Osawatomie, Kansas, or Bedford, Iowa, provided important flood control benefits in limited areas. On the other hand, several major reservoirs were under construction or in the final stages of planning. The large Osage River main stem dam near Warsaw, Missouri, had its name changed from Kaysinger Bluff to Harry S. Truman Dam and Reservoir in May of 1970, and constituted one of the largest single projects the District had undertaken. Upon completion it would stretch out in two great arms across west central Missouri. The magnitude of the reservoir can be seen in the acquisition of over 90,000 acres of land during 1970 for the reservoir. The estimated cost by this time had reached $276 million, placing it far and away above any other project. In contrast, the Smithville dam on the Little Platte River in Missouri, a few miles north of Kansas City, was estimated to cost less than $40 million to carry out its function of protecting Smithville, Missouri, as well as its other multi-purpose duties.

In general, all projects of the same nature followed a rather set pattern. Local flood

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Dam construction involved massive earth moving operations as well as complicated outlet facilities. This is a view of Wilson Dam's south outlet.

control works involved coordinated planning with those to be protected along with cooperation in obtaining land rights of way. Once authorized by the Department of the Army these could be contracted and usually completed in a relatively brief time. In contrast, reservoirs always involved more difficulties with local and state officials because of the drastic modification of the area. In almost every instance certain groups would oppose a dam. Some believed flooding of agricultural land could never be justified or compensated for, others cited local removal costs (often whole towns had to be moved), or the historical nature of the area. Indeed, one protestor said the Pattonsburg dam on the Grand River in Missouri would inundate the original site of the Garden of Eden. In more recent years, ecological objections have been raised. Wildlife refuges might be destroyed, the natural migration of fish might be interrupted, or sites of scenic beauty might be disturbed. Finally, the sheer issue of costs could stop a project. The Federal government often might reassign priorities either because of national defense needs or changing attitudes in Congress or the Executive office. Further, state or corporate officials could argue that road, railroad, or utility relocations were simply too expensive to be justified. At the Pattonsburg reservoir, it was estimated that raising Interstate Highway 35 above flood pool would add $18,700,000 to its construction costs.[21] Convincing everyone affected by a reservoir project that it would provide more good than

21. **Annual Report, 1970, p. 618.**

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harm often was beyond the ability of any man.

One factor seldom involved in dam construction was urban land values. Usually reservoirs were placed in rural areas far from even the most distant suburbs. This was not the case in the Blue River and Little Blue River valleys in the metropolitan Kansas City area. After a serious flood in 1961 the District Engineer conducted a survey and later issued a report calling for six small flood control reservoirs in the region. The expanding urban network badly needed protection, but local developers opposed the removal of good subdividable land from the market. As planning progressed in the late 1960's and early '70's it became obvious that obtaining final authorization could be done only over the staunchest protests of some Kansas City area land developers.

Another factor complicating the "public relations" aspect of new projects was the operation of old ones. In official terms the District makes it clear that all Corps of Engineer reservoirs exist primarily for flood control purposes. Yet some hearings and conversations stress the recreational aspects to a high degree to obtain local support. Thus people who invest sizable funds in resort areas are angered when flood control or navigation uses disrupt their activities. At full flood pool many recreational facilities are under water; also, when downstream releases for water quality or navigation lower the water level, wide mudflats appear where beautiful coves once existed. When conditions like this occur, the protestors soon obtain press coverage, creating a climate that convinces residents of other areas that dams are not local assets. The dropping of the level at Perry reservoir in the late 1960's to aid navigation on the Missouri brought a storm of protest that could only hurt other projects still in the planning stages. The Kansas City District would continue to present the overall requirements for flood control at public hearings, but as the system developed and damaging floods decreased it would become more and more difficult to "sell" multipurpose reservoirs.

An aspect of the Pick-Sloan Plan that focused entirely on rural areas was the agricultural levee from Sioux City to the mouth. The Kansas City District had the responsibility for over-seeing the construction of these units below Rulo. As noted above the project started in 1948; however, in 1954 construction ceased after a restudy of the program was ordered by the Department of the Army. The problem was twofold. First, there were arguments over the economic feasibility of protecting all bottom lands. In some instances the flood plain was small and difficult to protect. More detailed economic studies became necessary to determine if the federally funded construction could be justified by farm production. Second, privately built levees forced changes in the original plan. Many of these already existed, but their location, height, and dependability had to be surveyed before final plans could be developed. After 1959, the restudies were conducted on a unit by unit basis. In 1963, the District received authorization to recommence units which had been studied and found economically feasible. By 1963, 250,000 of the 400,000 flood plain acres were included in the levee system. In 1967 the District appointed a consultant, J.A. Gardner, a retired employee, to review feasibility techniques for the agricultural levees. His report stressed the need to use "Probability Procedures" rather than land prices as the test for the value of protected bottom land. Gardner argued that the selling price of farms simply was too unstable to draw conclusions from in regard to justifying flood control. Probability Procedures, on the other hand, "determine the amount and value of the food and fibre which the protected area is likely to produce for the national economy, and the goods and services required for its production."[22] Thus a truer picture of the importance of flood prevention would come from this method. By the early 1970's about 20 percent of the levee projects were completed or under way, comprising nearly 200 miles of levee. Studies continued on the most likely areas for additional work but no detailed planning would be undertaken before

22. J. A. Gardner, Consultant, Report on Feasibility of Selected Missouri River Levee System Units, Prepared for the Department of the Army, Kansas City District, Corps of Engineers, July 1967, pp. 50, 55-57.

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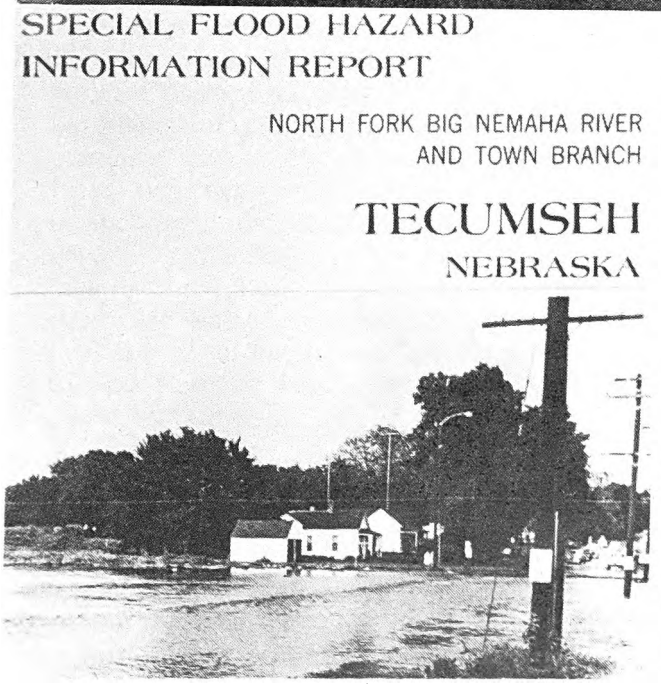
The agricultural levee L-448 south of St. Joseph, Missouri, shows the difference between the protected and unprotected areas. This aerial view was taken shortly after completion in 1955.



economic justification was assured. It might be that the complete agricultural levee would never see fruition, yet the vast majority of good productive farmland would receive protection.

An altogether different service, approved by Congress in the Flood Control Act of 1960, authorized the Corps of Engineers to issue Flood Plain Information. This was to be a service that would indicate the possible nature of floods in specific local areas. In order to obtain such a study a local government would apply to the appropriate state agency which would give the request a priority and forward it to the Corps. When a study was authorized the District would prepare a pamphlet that included essential background information, a study of past floods,

The cover of the report prepared for Tecumseh, Nebraska, graphically depicts what the Big Nemaha River had done in the past. Inside, the possible extent of future floods was explained.

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the possibility of future flood, and numerous charts, graphs, and photographs detailing the problem. These Flood Plain Information pamphlets did not recommend specific flood control projects. They were done to stimulate local residents so that zoning and other measures could be taken to limit encroachment on the flood plain. In some instances, control projects would emerge from local requests but the studies were informational and did not project proposals.

The Kansas City District compiled between twenty and thirty of these pamphlets for various governments in the region. In addition a flier was sometimes drafted which in simple language and colorful design explained the danger of floods and some of the ways to avoid damage from them. Photographs showed bridges that constricted heavy flows or subdivisions located on the flood plain. Later the approach changed as the District started to publish Special Flood Hazard Information Reports. These included maps which showed the possible extent of future floods as well as explaining what present protection existed.

Flood Plain Information remains a solely federally financed program that gives assistance to extremely limited areas. Like flood control projects that benefit specific areas, this activity is criticized by those who believe Federal spending should provide broad based assistance. It is possible that Congress will at some time revise the manner by which local activities are tested. For the time being Kansas City and many other districts perform services for areas as narrow as a single neighborhood and as broad as a whole river basin.

In review, the scope and cost of the District's flood control program almost defies comprehension. The planning, engineering, and administration of the diverse elements involved require every skill known to modern man. That mistakes are made is not surprising; that progress continues, albeit sometimes slowly, is a tribute to the people of the Kansas City District.

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CHAPTER IV: Evolving Activities on the District's Projects

As the great flood control program moved forward a growing number of reservoirs started to dot the Kansas City District. While their basic use was for flood control, irrigation, water conservation and maintenance of water flow, the very existence of a large body of water raised the question of recreation. Congress had approved the leasing of public lands for agricultural, recreational, or other private use in 1892, some fifteen years before the District had been established. However, it was not until 1944 that the Federal legislature specifically called for such use of reservoirs.

> The Chief of Engineers is authorized to construct, maintain, and operate public park and recreational facilities in reservoir areas. . .and to permit the construction, maintenance, and operation of such facilities thereon, in reservoir areas for such periods and upon such terms as he may deem reasonable: **Provided**, That preference shall be given to Federal, State, or local government agencies. . . . The water areas of all such reservoirs shall be open to public use generally, without charge, for boating, swimming, bathing, fishing, and other recreational purposes, and ready access to and exit from such water areas along the shores of such reservoirs shall be maintained for general public use. . . . No use of any area to which this section applies shall be permitted which is inconsistent with the laws for the protection of fish and game of the State in which such area is situated.[1]

Since this law went on the books in the midst of World War II, when all reservoir projects were under suspension, there was no need for immediate implementation. Still, it was clear that once the war ended and construction resumed, planning auxiliary uses for reservoirs would require attention. With the Missouri basin plan and other flood control projects around the nation coming into existence, the Chief of Engineers would have

Water skiing has become one of the many forms of recreation available on Pomme de Terre Lake.

to establish a format for developing an overall recreational program. This was done in the first part of 1946 when a Circular Letter went to all districts indicating how a "Master Recreational Plan" should be organized. In many ways the pattern was the same as the one used before a flood control project started. First the District would draft a proposal and then it would hold public hearings both to inform interested parties and to obtain the views of those who might use the facilities.

The Kansas City District would have to face the requirement quickly because the Kanopolis reservoir which had been authorized by the 1936 Flood Control Act, was scheduled for completion in 1948. A well thought out set of procedures for the original recreational plan would make future developments considerably easier. Therefore the District produced a "Manual of Recreational Area Management,"[2] along with a master plan

1. Public Law 543, 78th Congress.

2. Smoky Hill River Basin, Kanopolis Reservoir, Ellsworth County, Kansas, Master Recreational Plan, Appendix E: Manual of Recreational Area Management (War Department, Corps of Engineers, Office of the District Engineer, Kansas City District, K. C., Mo., July 1946).

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for the Kanopolis area. Those interested in using the new lake would be aware of what the Corps intended to do and how it would be carried out.

The Kanopolis Master Plan included a Preface that restated the primary use of the reservoir as well as what recreational role it would have. Since recreation usually becomes the most public and visible aspect of a project, resorting to primary functions of a project can result in public outrage. The District tried in all its contacts with potential users to make this clear:

> The reservoir while serving the prime purpose of flood control for which it was authorized has, by reason of its location and character, a potential secondary resource in that it can be developed into a recreational center to serve the recreational needs of the people in central Kansas and adjoining areas.

Again, in discussing "General Policies of Development and Management," the Preface noted "The Kanopolis Dam and Reservoir is designed primarily for the purpose of controlling floods. The recreational possibilities of the lake created by this dam constitute a second resource, but the policies governing the development of this second resource must not conflict with the policies governing the regulation of the lake for flood control." It might be argued that such statements overemphasize the obvious, but the District felt a strong need to make the "primary" role extremely clear.

The public recreation hearing for Kanopolis was held in Salina, Kansas, on May 8, 1946, shortly after work was resumed on the project. Col. W.E. Potter, the Kansas City District Engineer, chaired the meeting but he, too, stated in his introductory remarks that although the hearing would deal solely with recreation, "this is not the primary reason for building the dam. Flood control is the primary purpose of the project. . . ." Despite this warning the people interested in recreation at Kanopolis raised no question as to how flood control requirements could harm outdoor activities. Indeed, at the end of the morning session Colonel Potter said, " . . .it has been a 'love feast.' There has been no pillow throwing and feather throwing. I think you have a broad picture of the project. . . ." During the afternoon questions of private loans for the construction of cabins or resorts were raised and answered. The District would lease land for both uses, although minimum construction standards would be required and public access would be retained along the shore. Because of flood control requirements and the need to permit general use, private control of the lakeshore or private docks would not be permitted. These limits did not seem to disturb the participants. Their interest tended more toward group use of leases. Boy Scouts, various churches, and hunting or fishing clubs wanted permanent sites for their organizations. There had been little opposition to the construction of the Kanopolis Dam in the late 1930's, and the same situation existed during the development of recreation facilities.[3]

By 1948 a final plan for Kanopolis recreation had been drafted by the District. It included all the facilities that had been discussed at the hearing. There were cabin sites on both sides of the lake, group camps were given adequate space, "public day use areas" liberally dotted the shore and space was reserved for various concessions. In fact the only major modification from 1948 to the present was the leasing of "public day use areas" to the state of Kansas. These were developed into state parks and every facility ultimately deemed necessary for outdoor enjoyment was provided.

While Kanopolis reservoir was not constructed in a highly populated area, the 1940 Census showed over 750,000 people lived within a 100 mile radius of the lake. This number continues to increase as cities like Wichita, Manhattan, and Salina grow. A much different situation existed at the second reservoir undertaken by the District. Harlan County, Nebraska, is located slightly over half way across the state and just north of the Kansas line. No city of over 5,000 population is located within 25 miles; the closest com-

3. Ibid., Appendix A: Transcript of Record of Public Hearing, Salina, Kansas, 8 May, 1946, Correspondence with Local Interests, pp. 1, 2, 4, 31.

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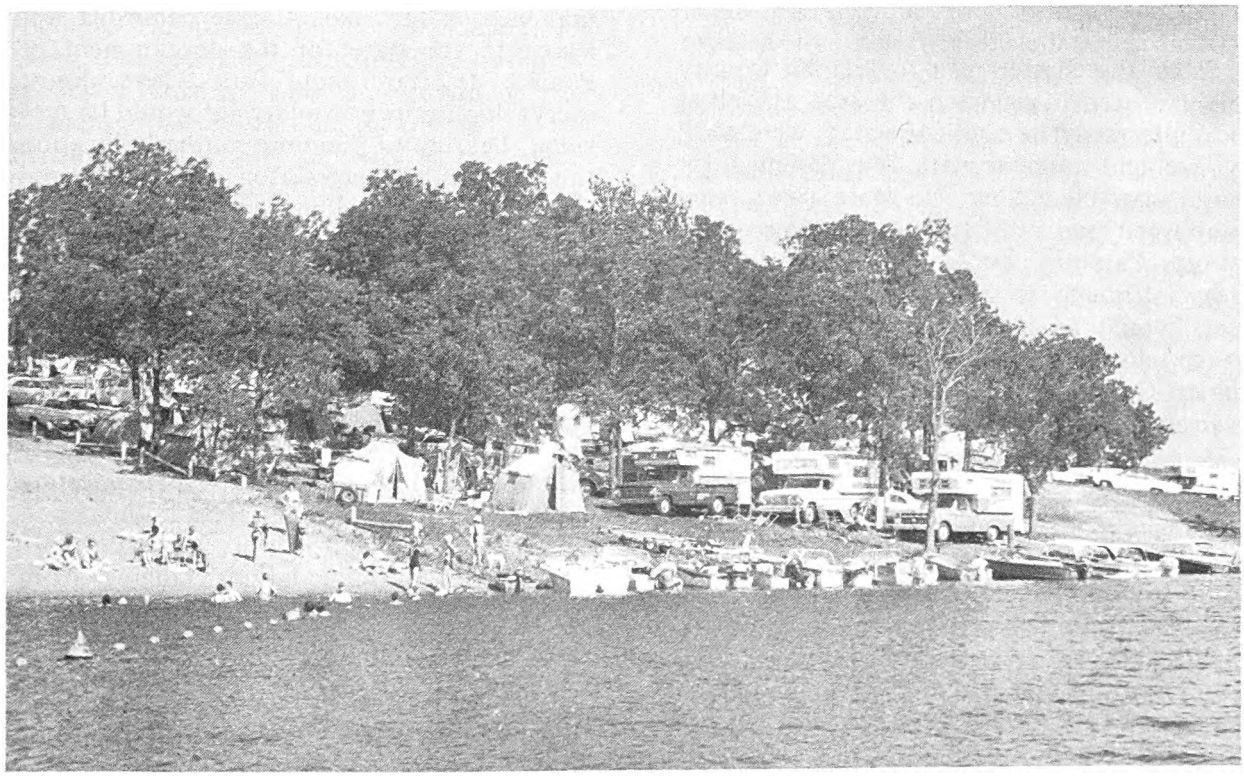
munity of over 25,000 is Grand Island, over 75 miles away. Given the markedly different location, the recreational need would no doubt differ considerably. When the public hearing about a recreational plan for Harlan County was held in January, 1950, at Alma, Nebraska (it would be on the shore of the completed lake), a sizable number of those attending were farmers. Since agriculture had long been the major industry in the region, the farmers were concerned over damage that might occur to their property when hunters or fishermen used the lake. Some were interested in leasing land the government had purchased for the reservoir area but feared public use would destroy crops. As the hearing progressed it became obvious that recreation meant different things in different areas.

In a topic unrelated to agricultural concerns the secretary of the Nebraska Game, Forestation and Park Commission, Paul T. Gilvert, spoke at some length about the project. He obviously had serious doubts about reservoirs in general and Federal involvement in Nebraska in particular. He warned the crowd that recreation was not free.

> Let us understand that Santa Claus is not coming into Harlan County with a great big bag thrown over his back and he is not going to dole out to you all of these fine things in the form of certain recreation areas and large trees overnight to give you folks all of this wonderful fishing and hunting. Every single thing that you see on this page of the map and this map and this map are all being paid for. I am paying for it. You are paying for it. It is costing money. We all are watching our national budget and it calls for this sum of money and that sum of money, and all of us wonder where it is going to end. . . .[4]

It was little wonder that the District Engineer, Col. Paul D. Berrigan, concluded the hearing by saying, "I want to thank you all for

4. Transcript of Public Hearing Held at City Auditorium, Alma, Nebraska, Department of the Army, Corps of Engineers, Wednesday 18 January, 1950 (typewritten), p. 35.



At "Pomme" it is possible to have your camper, boat, and swimming beach all within a few feet of each other.

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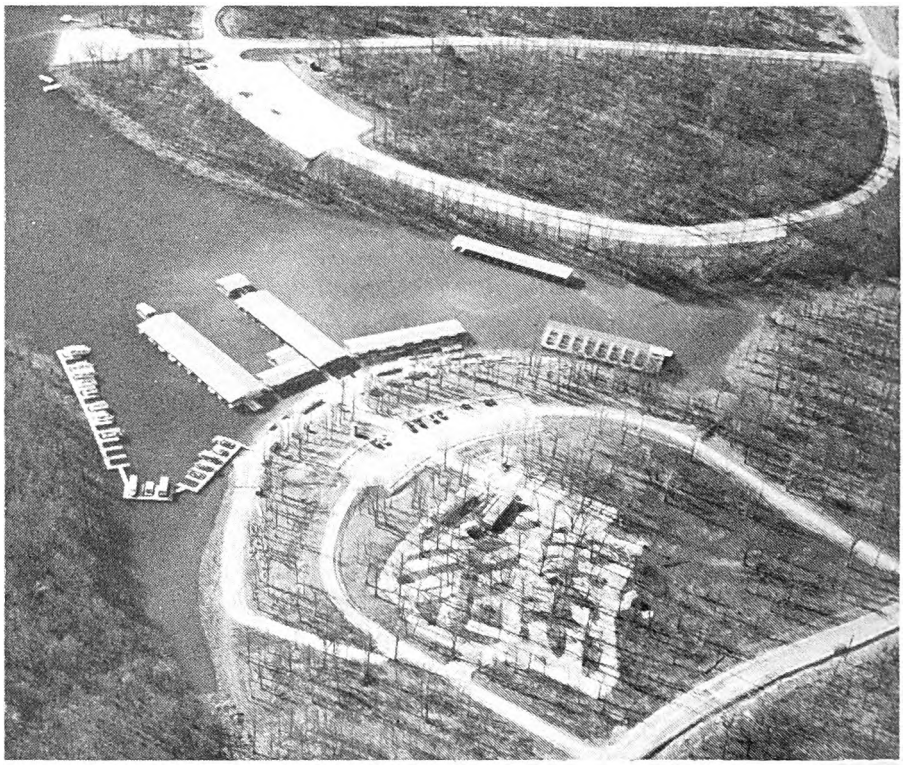

A marina on Lake Stockton. Many area residents rent slips and leave their boats in the water all summer.

coming. I hope you all have got your complaints off your chests. . . ."

When the master plan for Harlan County was executed it reflected the area as well as local interests. The public use areas were small in size and number with few designed for more than picnicking. No state parks were established and only two group camps were set up. Camping would be available in nine areas, although it was assumed that many users would be hunters and fishermen. The sharp divergence between Kanopolis and Harlan County indicated the value of public hearings and tailor-made master plans.

The first reservoir to be completed in Missouri was Pomme de Terre in the Osage River basin. From its dedication in 1961 onward it was clear that recreation would be a major aspect of the lake's use. Mileage to the dam measured only 73 from Springfield, 110 from Jefferson City, and 140 from Kansas City. This, plus the fact that the general area—part of the Ozarks—had developed an important tourist and recreation industry over the years, assured heavy use of the lake. Public use areas envelop the whole damsite area as well as several other sites on both major branches of the lake. A large peninsula was leased to the state for the development of Pomme de Terre State Park where almost everything campers could want would be provided. Because of the more southerly location this lake has a longer season, with fishing and hunting going on well into the autumn.

Pomme de Terre has earned the reputation as the most beautiful reservoir in the District. Its clear spring-fed waters, backed up into innumerable coves in the sharply rolling hills of the Ozarks, have earned it the name "jewel of Missouri." Because of its location and lovely setting this lake has developed rapidly as the site of numerous private real estate developments. Over eighty areas in the region have been assigned to resort home development, with accommodations ranging from weekend cabins to luxurious lakeview homes. In its first decade Pomme de Terre showed how rapidly the recreational aspect of a Corps reservoir could develop. For 1971 the District could report a "recreational visitation" of 2,178,000 people to this lake.

As additional dams were completed on the

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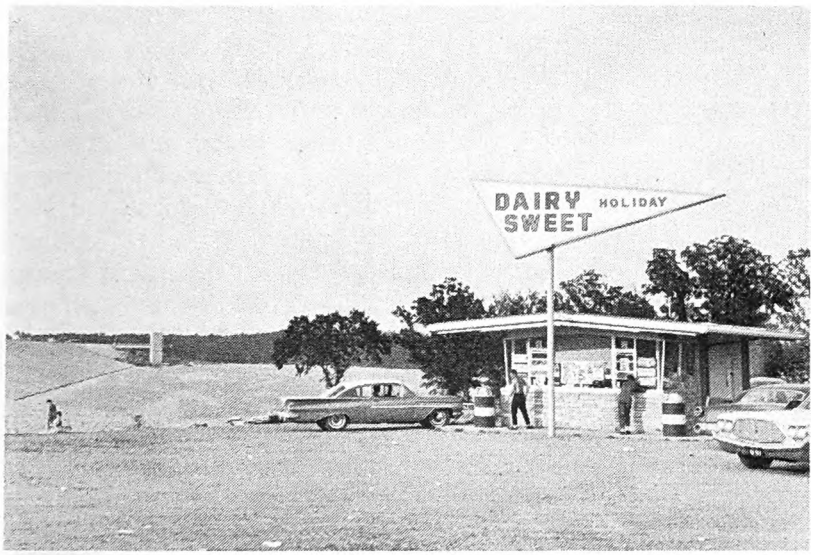

Within sight of Pomme de Terre Dam, a visitor can stop for a cool drink or snack.

Kansas and Osage-Marais des Cygnes rivers the recreational planning question was repeated again and again. Usually one or more of the public use areas would be leased for development as a state park, while the Corps constructed recreational facilities in its own areas. Normally the District contracted for the building of beaches, picnic grounds, boat ramps, and camp grounds, and then opened them to the public. In a few instances, the Corps charged fees for camping, but most items involving sales are conducted by "concessionaires" who bid for the right to run marinas, restaurants, or boat storage units. Thus direct income to the District for recreational activities is modest at best. Even so, 75 percent of any funds collected are returned to the local government for its use. As more lakes appear, the recreational role of the Corps of Engineers will continue to expand and the turreted castle will become even better known.

The second half of the 1960's witnessed a new direction in recreation projects when Congress enacted the Federal Water Project Recreation Act.[5] This law spelled out a cost sharing formula for recreation and wildlife preservation areas between local governments and the Federal government. In the Kansas City District, it resulted in park construction on the Missouri River. By 1970 five had been completed, with several others in the planning stage. The best known one was River Front Park in Kansas City, Missouri. The availability of boat ramps along with other recreational facilities increased interest in the river as well as publicly identifying another Corps of Engineers project.

An aspect of the District's work that was much less obvious to the casual observer involved hydroelectric installations. Federal interest in the use of water had long existed, and had been a major part of the "308" studies in the early 1930's. The main stem Missouri River dams all were important power producers as were many other Federal projects. In the Kansas City District, however, power production would be less important than other matters because of the generally lower flow. Since the District was too far downstream for a Missouri main stem dam, and since opposition to a reservoir on the Kansas River had led to cancelling of the Topeka dam, the only non-tributary dam would be on the Osage River. Studies had shown that enough flow was available to make power production economically feasible not only on the Osage but possibly on a few of its Ozark tributaries. In 1954 Congress authorized the addition of a power plant to Pomme de Terre. After further study the District Engineer concluded that the amount of water available was insufficient to make electric generation economical and the plan was dropped.

5. Public Law 89-72, 89th Congress.

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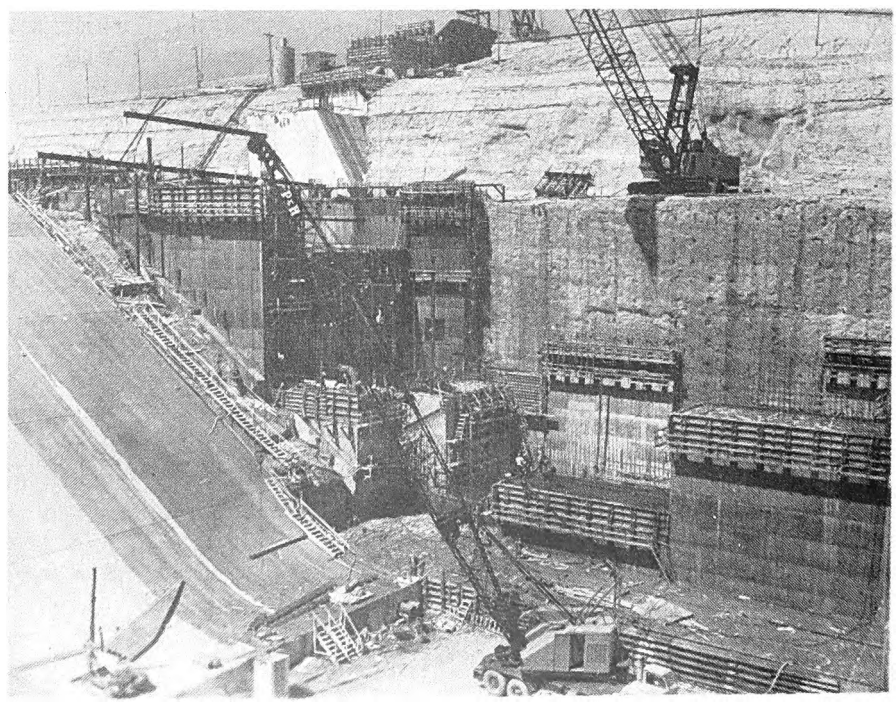
Kansas City's River Front Park gives local citizens a chance to relax by the famous Missouri River.



Inclusion of hydroelectric power in a dam project required additional facilities of the type shown here. During 1968, the Stockton Dam was made ready to receive a turbine and generator.

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At two other dams the findings were favorable. A power plant capable of producing 45,200 kilowatts was included at Stockton dam on the Sac River southeast of Nevada, Missouri. The powerhouse contains only one generator which will need only 14,000 cubic feet per second outflow for maximum production. The 55 million kilowatt-hours of annual production, while not large in terms of area demand, will add to the region's supply as well as providing some income for the operation. A much more impressive power facility has been planned for the Harry S. Truman dam on the Osage near Warsaw, Missouri. It will include, some time after projected completion in the late 1970's, six generators with a total output of 160,000 kilowatts. Furthermore, reversible turbines will be able to pump water back up into the reservoir during periods of slack demand so that more water will be available for power production when requirements increase. This more sophisticated technique has been made possible because the headwaters of the Lake of the Ozarks extend to the foot of Truman dam. Thus the lower impoundment will aid the Federal project, which in turn will assist the private dam when demand is high and both units want to operate at full capacity. Even though hydroelectric power production will never be a major aspect of the Kansas City District, it is another dimension of the overall tasks undertaken by the Corps.

Electric power provides a good example of one of the economic impacts of a finished dam, even though the local impact is usually minor. The more important changes in the region of a lake involve the creation of a recreation industry, changes in agricultural activities, and frequent adjustment of populations. Since most reservoirs are in rural areas where no sizable body of water has existed, the impact can be drastic. A resort economy often develops with many motels, lodges, and fishing or hunting cabins appearing. Frequently these are owned or managed by local people who employ other nearby residents to serve visitors from all over the country. As lakes continue to develop a whole range of service activities begins to appear. Private housing developments near the lake require stores, gasoline stations, and other shops to cater to their needs. Entertainment soon becomes important to those on vacation and taverns, restaurants, motion picture theaters, country music shows, and a multitude of other diversions appear. Beyond these service

An aerial view of Pomona Reservoir shows the road systems for several housing developments that are under construction.

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functions local boat and residential construction is stimulated. Indeed, a Kansan wrote to his congressman almost as soon as the Kanopolis dam was approved in 1939 to find out about starting a boat factory. After manufacture, boats need to be sold or serviced and this provides a great deal of business for the lake concessionaire as well as the private businessman. The change from a landlocked rural setting to a busy resort can best be understood by viewing before and after photographs.

Changes in agriculture resulted from both the construction of the dam and the impact of land use planning that accompanied it. Obviously a great deal of good bottom land was permanently lost when a lake was formed. This destruction of productive cropland had long been a major source of opposition to reservoir construction. However, farming changed drastically in areas not given over to the lake. In the upper reaches of the reservoir the Federal government acquired flowage easement so that flood waters could be impounded during times of emergency. The Corps required procedures in these areas that included soil and moisture conservation, wild life protection, and the establishment of permanent pastures with controlled grazing. Any funds obtained from agricultural leases would be partially returned to the state for local use. In general the increased emphasis on land use, wild animal preserves and reforestation set a good example for farmers in a reservoir area. While agricultural changes were less dramatic than those related to recreation a distinct difference did occur.

When private developers built subdivisions in a reservoir area the increased population demanded the many services noted above. In addition, however, an increase in permanent residents—in contrast to summer inhabitants—modified the area. Since retirement homes had become popular on the private lakes in the Ozarks, it was natural that the same thing would occur near government reservoirs. While the milder climate of northern Arkansas drew many elderly folk, Pomme de Terre and Stockton reservoirs have begun to attract retirees. These people changed a reservoir area both by what they brought with them and by what they needed. As their numbers grow, the economy of each lake area will grow with them. Possibly no lake in the Kansas City District is destined to become a retirement haven, but several projects will clearly modify the local population.

Whether a reservoir generated dramatic industrial and residential changes, like Pomme de Terre, or led to little more than increased fishing, hunting and camping, as did Harlan County, every aspect of a multipurpose dam remained important. One activity that often created difficulties for the District involved the release of water from a reservoir when natural flow downstream became inadequate. The growth of many communities in the Kansas River basin had increased water requirements for both residential use and sewage disposal. Even though providing a sufficient downstream flow was included in calculating the capacity of most reservoirs, the terms "water supply" and "water quality control" were heard more frequently as urban centers expanded. Since cities on the Kansas River released treated sewage into the river, adequate water was needed for dilution prior to the next city's use. This "pollution abatement" has become a growing part of water quality.

Congress noted the importance of an adequate supply when it passed the Federal Water Supply Act of 1958. Under the terms of this legislation a state could request additional storage at a reservoir if it was willing to reimburse the Federal government for any costs involved. As the nation became more and more aware of natural resources the reservoirs became more important. Of course, water quality has not been the only use. Harlan County supplies part of its pool for the Bureau of Reclamation's irrigation program, and Perry and several others are frequently called upon to provide water for navigation needs on the Missouri River. Needless to say, in times of prolonged drought the water level can become so low that recreation is sharply curtailed. This condition has led to protests at several reservoirs, but despite the inconvenience to users of one of the "multipurposes," the reserve water has eliminated numerous other problems.

By the end of the 1960's the Corps of Engi-

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Low water on Tuttle Creek Reservoir left this marina "high and dry." This view was taken during the winter of 1967, when much of Kansas was experiencing drought conditions.

neers became involved in a controversy that it never expected. As the nation's atmosphere and water approached dangerous levels of pollution, concern over the environment increased. Discussions about ecology—a term few laymen had ever heard—took place in universities, state and national legislatures and over the public media. Massive alterations of man's surroundings became a target of the new "reformers." In 1969 Congress passed the National Environmental Policy Act which required an "Environmental Statement" for all projects modifying the existing environment. Soon pipelines, roads, power plants, and reservoirs were being catalogued as destroyers of the environment. Since the Corps had always considered all the impacts of its reservoirs, and since it believed that on the whole it aided, not harmed, the environment, attacks on dams as enemies of the environment came as a shock.

The scope of the act led to difficulties because it was not clear who should make Environmental Statements or whether they needed to be made on projects already approved by Congress. Even a leading engineering journal noted that the Supreme Court would have to decide who was responsible for compliance.[6] In an attempt to point out its long term concern over environmental matters, the Kansas City District's information folders on each dam included a list of "Environmental Objectives." Stockton Lake's said:

> The Corps believes there are four main objectives to be considered in developing and managing a project like Stockton Lake:
>
> (1) To preserve unique and important ecological, aesthetic, and cultural values of our national heritage.
>
> (2) To conserve and use wisely the natural resources of our Nation for the benefit of present and future generations.
>
> (3) To enhance, maintain, and restore

6. **Engineering News-Record, June 1, 1972, p. 7.**

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the natural and man-made environment in terms of its productivity, variety, spaciousness, beauty, and other measures of quality.

(4) To create new opportunities for the American people to use and enjoy their environment.

With these objectives foremost in mind, a forestation and vegetation plan has been developed for the lands around Stockton Lake. This management program will result in a superior vegetative cover system to enhance public recreation use, wildlife habitat, and aesthetics.[7]

Despite this kind of publicity, pressure against dam construction increased.

The classic confrontation came when the Environmental Defense Fund—a national group—filed a suit to have construction on the Truman dam halted. Numerous kinds of damage to the region would result from the dam, the Fund argued, and also no Environmental Statement had been filed. A Federal District Court in Kansas City heard the case, finally ruling that construction could continue but that certain environmental issues needed additional consideration. At the same time the District rushed its work on a statement, completing a draft in September of 1972. Work continued under additional funds granted by Congress and it appeared that the Truman dam would be completed. Yet the question of environmental impact now added another hurdle the District had to clear before a project could be started. The disconcerting fact was not the need for knowledge about what a reservoir would do, but rather that opponents of dams in general would have another means to delay adequate flood control.

One fact continued to be made clear for District personnel—opposition to reservoir projects never ceased, it only took on different forms. Whether old arguments about losing good bottom land or new ones based on the destruction of the "paddle fish breeding grounds," the Corps had to try to convince residents of a damsite area that flood control and other water uses were for the common good. Even the finished dams became involved in controversies when water levels were lowered for non-recreational uses. Indeed, it seemed as if the District Engineer spent an inordinant amount of his time meeting with groups to discuss some aspect of dam planning or operation. In 1966 representatives of the Manhattan, Kansas, Chamber of Commerce protested the lowering of water at Tuttle Creek. Col. William Kratz, the District Engineer, spent two hours with the group explaining how the extended period of drought had required draining the reservoir to maintain water flow on the Kansas River and navigation on the Missouri. The interesting part of the discussion was that the local people seemed to have developed a kind of possessiveness about "their" lake and had difficulty understanding that it was part of an overall system with many priorities.[8] In this case Colonel Kratz was successful, yet in other instances hard feelings remained despite detailed explanations.

One task the District had to perform on a regular schedule was the inspection of the many dams. The concrete would be checked for cracks or settling, while sluice gates and all other parts would be studied to see if excessive wear or damage had taken place. A major inspection required draining the settling basin—in the case of Harlan County, some 15 million gallons of water—so that undermining as well as concrete conditions could be observed. When such large quantities of water were removed from the downstream side of a dam, consideration had to be given to salvaging the fish. At Harlan County the Nebraska Fish and Game Commission did the job. Frequently the District invited other engineers, either from neighboring districts of the Missouri River Division, or the Office of the Chief of Engineers, to participate in the inspections. Because every dam had certain unique features and operations, the information gained by inspection was of value to the

7. Copies are available at the District Headquarters and at the reservoirs. Comparison with earlier folders for other projects shows the marked increase in "environmental" concern.

8. Kansas City District Information Bulletin, Dec. 14, 1966.

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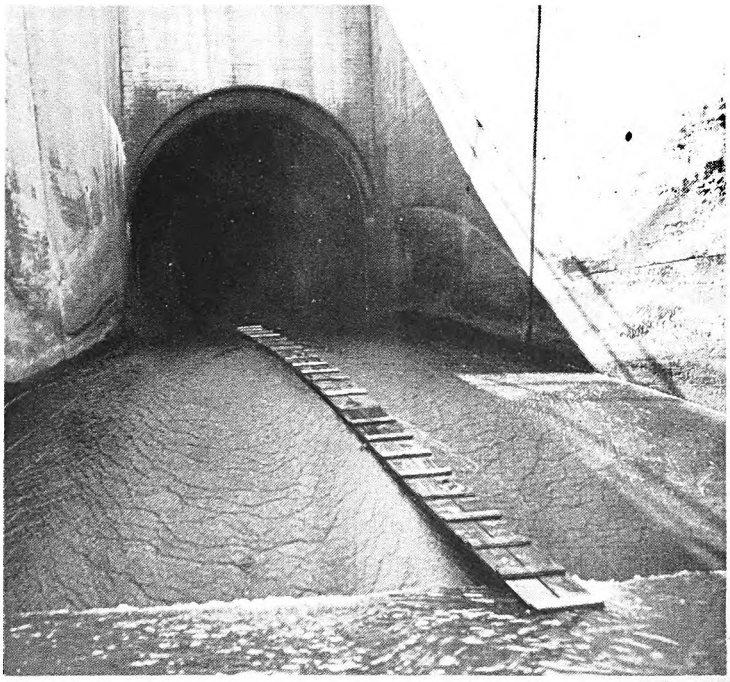
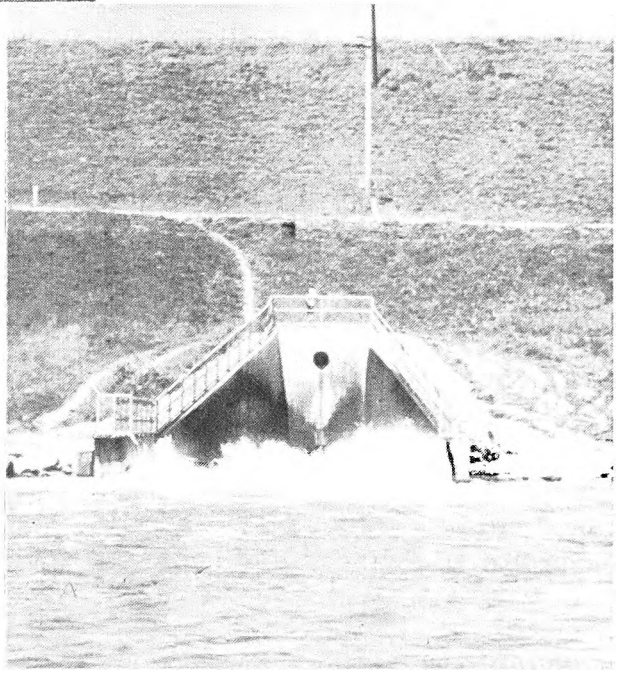


The tunnel outfall of Kanopolis Dam has been drained and prepared for inspection. The "catwalk" protected the inspectors from residual water and mud.

whole Corps. The five year major inspection schedule required a great deal of work but the knowledge gained about the operational adequacy made it worthwhile.

The numerous activities beyond the basic obligations of flood control and navigation required constant attention on the part of the District's personnel. No lake's recreational design would ever become static as long as interest in outdoor activities remained dynamic, just as no project could be allowed to exist without constant inspections. Even after the entire flood control project is completed the Kansas City District will still face the wide scope of housekeeping and upkeep activities that it now does along with new work.



As a contrast to an empty outfall, the outlet of Rathbun Dam is releasing some 12,000 cubic feet per second after a summer storm.

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CHAPTER V: Military Construction

From the earlist days of the republic, the Corps of Engineers had been the military "builders" for the army. Whether breastwork at Bunker Hill or pontoon bridges over the Rhine River the combat engineer did the job. On the home front the Corps had always been responsible for seacoast fortifications, a limited but complex operation. However, as the demand for a modern fully equipped army increased during the early 1940's, the Quartermaster Corps found itself overwhelmed with the dual task of supplying as well as housing the army. Indeed, this branch exceeded its traditional role of providing housing by assuming construction activities for airfields, munition plants and many other facilities.

In order to allow the Quartermaster Corps to turn more of its attention to supply matters some construction projects were removed from its jurisdiction. In November, 1940, airfield projects were turned over to the Engineers; in December, 1941, (a scant week before Pearl Harbor) all military construction became their responsibility. Since this change came about through legislation it required a great deal of implementation. In January, 1942, the Chief of Engineers started to assign projects to districts in which they were located.

As the Kansas City District received new duties it quickly reorganized, adding two divisions to handle construction activities. An Industrial Plants Division would oversee construction at Jayhawk Ordnance Works, the Aircraft Assembly Plant, and the Kansas Ordnance Plant all in Kansas in addition to the Lake City Ordnance Plant near Independence, Missouri. A Posts and Airfields Division would direct activities at Camp Crowder, Fort Riley, Fort Leonard Wood, Camp Chaffee, and the Topeka Airport. However, as time passed it became apparent that districts based on watersheds were not necessarily adequate for military construction. Thus, changes were made which created different boundaries for civil and military work. During 1942 the Kansas City District undertook projects in the state of Kansas that were in either the Tulsa or Albuquerque Districts. On December 12, 1942, the District received an order transferring military construction in St. Louis, Missouri to the Kansas City District.[1] At that time a project in the part of Nebraska included in the Kansas City District (the Bruning Airfield), was transferred to the Omaha District. By early 1943 the Kansas City District had evolved as the two state area of Kansas and Missouri. This would continue to be its territory until military construction ended in July, 1947; it would again become the limits during the period 1950-1970.

Because the District started working on Air Corps fields over a year before it assumed most other military obligations, these projects provided the primary experiences in this new effort. The first two tasks undertaken were at Fort Riley's Marshall Field and Fort Leavenworth's Sherman Field. Although not large in comparison with future contracts (Marshall Field cost $1.76 million and Sherman $704,000)[2], the organizational experience gained in these projects was invaluable. The first real industrial facility under the District emerged at the same time. Even though an assignment of this kind was somewhat unusual at such an early date, work on the Air-

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1. "History of the Kansas City District, Corps of Engineers" (mimeographed; no date) in the historical file of the Kansas City District, Corps of Engineers, notes the legislation that shifted construction from the Quartermaster to the Engineers and the date of the transfer of St. Louis, pp. 4-5; evolution of the assignments outside the civil project boundaries can be seen in the Organization Charts dated July 1, 1940, July 1, 1941, Feb. 1, 1942, and Jan. 16, 1943, as well as in Status of Assignments of Projects to the Kansas City District (1942-1944), 1505-20, in the historical file of the Kansas City District.

2. Figures for government expenditures are from Quarterly Inventory, Owned, Sponsored and Leased Facilities (War Department, 31 December 1945), in All Types of Facilities Alphabetically by States from Kansas and Missouri; information on costs for Marshall and Sherman Fields came from "Monthly Project Reports, War Construction," 31 December 1942, and indicated that both fields were completed. In addition, M. Eugene Stalker and Marshall Hoy, both District employees at the time, provided a great deal of helpful information on these early projects.

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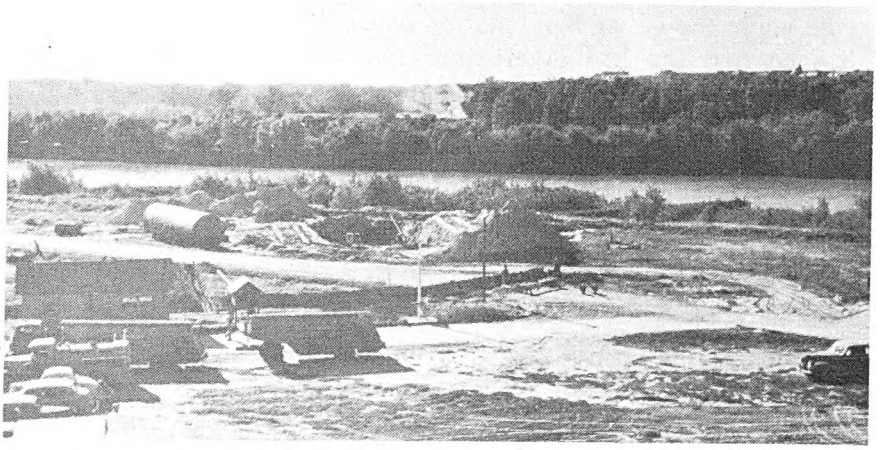
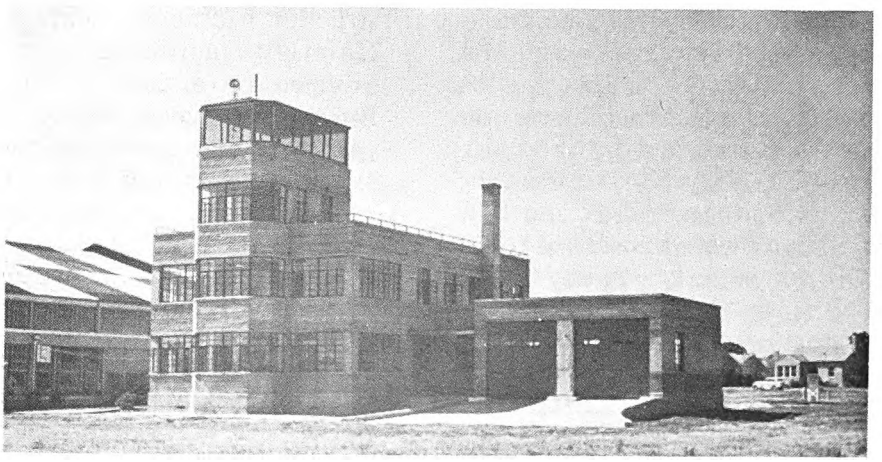
The aircraft assembly plant in Kansas City, Kansas' Fairfax District is shown in September, 1941. At this time, the building and productive equipment were about 70 percent completed.

At Marshall Field, Fort Riley, Kansas, a new gasoline storage and fueling system were installed during the summer and fall of 1941.





Marshall Field's new operation building and fire station as it looked upon completion in July 1941.

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craft assembly Plant and the Fairfax Airport in Kansas City, Kansas, were placed under the Kansas City District in March of 1941. In fact the project originated with the Corps of Engineers, never having been under the Quartermaster. By the end of the war the expenditures for the assembly plant would total over $27.2 million while the airfield would cost slightly more than $1.1 million.

In the months after Pearl Harbor the number and type of projects literally exploded. Major Air Corps fields at Salina (Smoky Hill Army Airfield) and Topeka, Kansas, and Sedalia, Missouri, absorbed vast sums of money as well as a great investment in supervision. Along with these bases, the need for satellite fields and some smaller training centers had to be met. At Coffeyville, Kansas, a combat crew training station cost $8.6 million and an auxilliary field totalled slightly over $100,000. Dodge City Army Flight School cost about as much as Coffeyville while the Great Bend station was a little less. Across the line in Missouri the Vichy Army Airfield—built mostly to train glider pilots—cost only $3 million. Rosecrans Field at St. Joseph provided training facilities for about $6 million. In a slightly different vein the Wichita Municipal Airport was dramatically upgraded to provide a runway for B29 bombers built at the Boeing Airplane Company.

Constructing army camps also took on sizable proportions. Expenditures at Fort Riley, Kansas went beyond $28 million; Fort Leonard Wood, Missouri approached $50 million; while Fort Leavenworth, Kansas (a much smaller operation) cost only $1.5 million. Literally in a different league, as far as expenditures were concerned, were the ordnance plants. Three started by the Quartermaster Corps—Lake City near Kansas City, Jayhawk at Baxter Springs, Kansas, and Kansas at Parsons, Kansas—were transferred to the Kansas City District in early January, 1942. Sunflower at Eudora (a distant suburb of Kansas City) originated with the District, while the St. Louis Ordnance Plant came to Kansas City on December 1, 1942 after almost a year's direction by the St. Louis District. By the end of World War II the total spent on the ordnance plants was over $314 million with Sunflower leading the way at $183 million.[3]

In addition to providing the facilities to train military personnel and to oversee construction of the means of war, the District found itself involved in constructing housing for captured enemy forces. Two prisoner-of-war camps were assigned to the Kansas City District in December, 1942: one at Concordia, Kansas, and the other near St. Louis at Weingarten, Missouri. The Kansas camp covered over 650 acres and cost the U.S. taxpayers $1.8 million. The Missouri location was both larger and more expensive—839 acres and almost $3 million.

The pace of construction increased dramatically during the early part of the war with airfields and army camps leading the way. As these projects were completed the District's major thrust turned more to building facilities for war production. When the bulk of the army moved overseas the District came under increasing pressure to reduce costs. This was especially true for camps where literally everything built was "temporary." Army posts had little in the way of frills and attempts to upgrade living conditions brought on a strong reaction from Secretary of War Henry Stimson in April, 1943.

In contrast to the wooden construction of military posts, production facilities were usually concrete, steel and brick. Yet even these were quickly built; long life was not considered important for these structures. All of the efforts that went into military construction had but one aim—win the war. After Germany and Japan surrendered, it was assumed by almost all Americans that the nation and the economy would return to peacetime pursuits. Thus the District's total expenditure of well over $900 million was seen in the light of a very specific goal. Even though arguments arose over total spending or contract granting (some critics felt "cost-plus-fixed fee" contracts were too expensive), there was general agreement that the Kansas

3. Quarterly Inventory, Owned Sponsored and Leased Facilities (War Department, 31 December 1945); other project figures are: Jayhawk $29.8 million, Kansas $32.8 million, Lake City $57.5 million, and St. Louis $9.7 million.

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City District had played a vital role in World War II.[4]

When the war ended in 1945 contracts were terminated and many facilities deactivated. Numerous plants were sold to civilian firms with the War Assets Administration acting as the government's agent. The District quickly began to redirect its manpower to civil projects which had been neglected during the war. By 1947, when the military construction authority was re-assigned to the Omaha District, Kansas City turned its total effort to flood control and navigation. Military construction was not a part of the District's responsibility again until the outbreak of hostilities in Korea. With the new war the District undertook a mission somewhat similar to that of World War II.

In one sense the demand changed drastically. During the earlier war new facilities had to be built; now rehabilitation of existing plants and bases became the first priority. Also the introduction of nuclear weapons in the war against Japan had convinced many people that future warfare would be totally different. It was thought that armies would no longer contest in the field or aircraft battle in the skies. Now a few bombers would devastate the enemies' whole land with the ultimate weapon. Korea proved this theory wrong. Conventional warfare remained the means of waging this "limited" war. Thus, traditional weapons and ammunition would be needed—a need which placed an extra heavy burden upon the Kansas City District when responsibility for military construction in the two state area was returned to it on July 1, 1950.

The District's ordnance plants required major rehabilitation before they could return to productivity. Long periods of idleness caused serious deterioration of plants and machinery. In addition, the five years which had elapsed since the end of World War II had seen the development of several non-nuclear weapons. Thus, it became necessary for the Corps not only to reopen many of the existing facilities but also to oversee construction of several new ones.

Projects included numerous peripheral tasks such as improving railroad spurs, access roads and electrical systems. At the St. Louis Ordnance Plant a $7 million contract included rehabilitation work (one building alone cost $2.2 million) as well as new boilers valued at over half a million. Across the state at the Lake City Ordnance Plant an extensive program costing nearly $10 million bought, among other things, a $2 million warehouse complex and a $1.5 million 20 mm ammunition facility. In Kansas, the most widespread rehabilitation project occurred at the Sunflower Plant near Eudora. Contractors spent $3.7 million to update the equipment and another $2.8 million to erect a nitric acid plant. Much more was spent on the solventless powder facility with rehabilitation and new construction approaching $23.5 million in building contracts.[5]

Producing ammunition and armament for a war machine shared priorities with the equally important task of preparing men to use the equipment. To train and house soldiers the District made additions to several installations. New barracks costing $2.2 million were added at Fort Riley, while Fort Leonard Wood received new classrooms at a cost of $230,000.

As the Korean War lengthened into a second and third year the District turned attention to the old army airfields. In 1947, with the passage of the National Security Act, the Air Force had been established as a separate branch of America's defense organization. Although the Department of the Army no longer controlled the Air Force, the Army Corps of Engineers still maintained the responsibility for Air Force construction projects. As the old Army Air Corps took on the name of Air Force, the airfields adopted the new title of Air Bases. Of the twenty-odd airfields which the District built during World

4. Lenore Fine and Jesse A. Remington, **U.S. Army in World War II, the Corps of Engineers: Construction in the United States** (Washington, D.C.: U.S. Government Printing Office, 1972), Chapter XVIII, "Cutback and Continuation," provides an overall picture of the post peak period.

5. 1501-07 Military Construction Reference Paper File. This card file at the District Office provides a summary of most building projects undertaken during the 1950's and 1960's.

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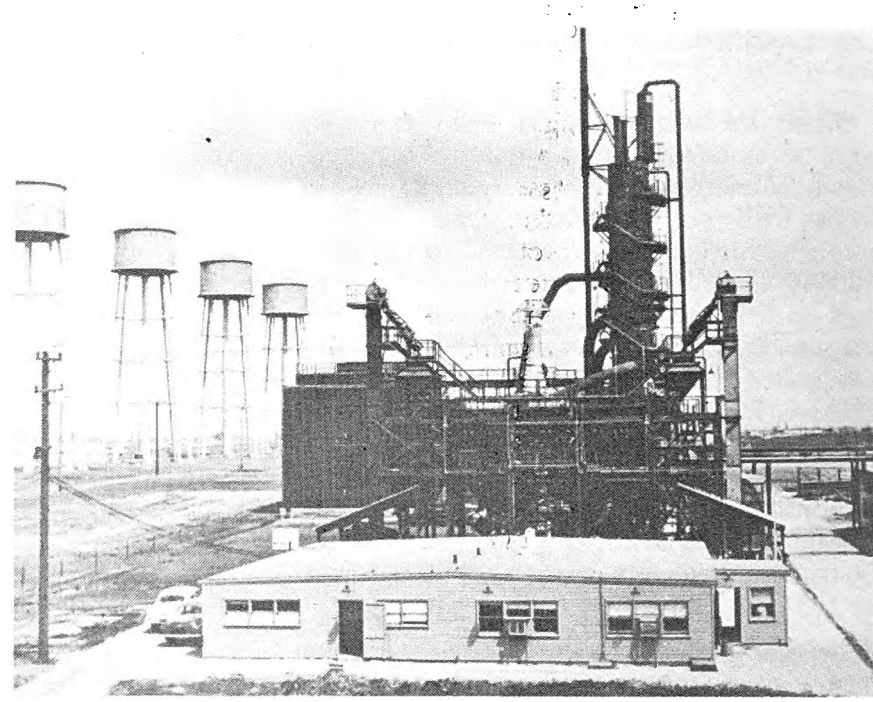

The nitric acid plant at the Sunflower Plant improved the facility during the Korean War.

War II, only a few remained active. Many of them had either been deactivated or given to nearby cities as municipal airports. The Air Force began concentrating its efforts at five major locations in the two-state area. Three of the locations, Topeka Air Force Base, Sedalia Air Force Base, and Smoky Hill Air Force Base were in use during World War II. The other two, Grandview Air Force Base south of Kansas City (an auxiliary field for the Vichy Army Airfield had been constructed here during 1942) and Wichita Air Force Base near Wichita, Kansas were new. In order to bring these five bases up to an effective level the Kansas City District began an enormous building program.

While the primary mission of an Air Force installation focused upon putting planes in the air, a base needed to be much more than an airfield. Living quarters for its personnel as well as support buildings to maintain the multi-million dollar equipment had to be provided. Although the crews who flew the aircraft often numbered five or less, the ground force needed to maintain the plane usually tripled or quadrupled that number. The Air Force specialist, whether pilot or mechanic, required sophisticated facilities to complete his task. The Corps supplied the facilities.

The quickly built, temporary structures of the 1940's had to be changed and the Air Force became a permanent establishment. Wichita Air Force Base was the first placed under construction. In May, 1951, the District received bids on a $300,000 training facility and airfield expansion. Following closely in June the Corps approved contracts totaling $5.6 million for officer and enlisted men's housing. By late summer runway, taxiway, and parking aprons valued at over $6.5 million were also underway. In August, the District engineers completed details on two more contracts: one initiated $1.5 million in work on more training buildings, and operations building and warehouses, while the second called for $1.8 million in streets and roads. Throughout the remainder of 1951 and continuing into 1952 and 1953, the Corps maintained the same level of construction at Wichita. Air Force building programs at Sedalia, Grandview, Topeka, and Smoky Hill followed schedules almost identical to that of Wichita.

One project that combined the navigational use of the Missouri River with military con-

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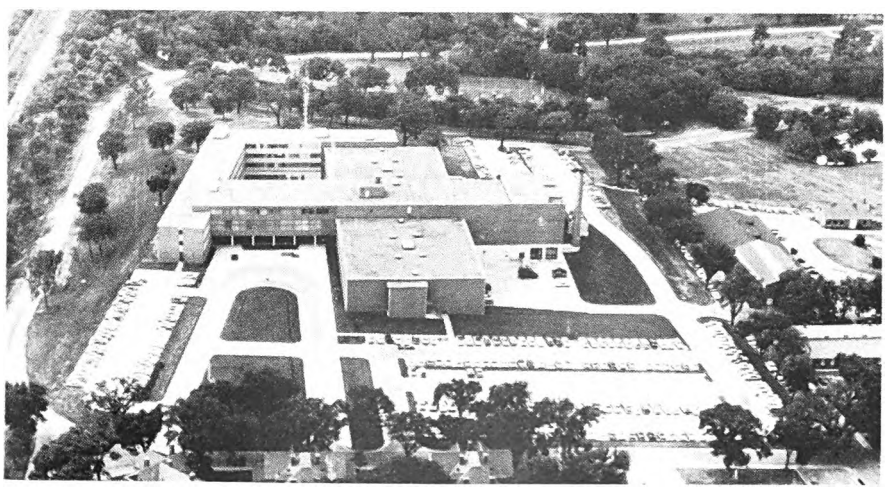
The Air Force's "tank farm" near Parkville, Missouri, could receive fuel from river barges and then distribute it to area bases by tank truck.

struction was the Bulk Petroleum Storage Facility near Parkville, Missouri. Built between 1951 and 1953, the facility had five fuel tanks with a capacity of 100,000 barrels each. The storage tanks themselves cost nearly $200,000, while the total project ran well over $1.5 million. When completed it provided the Air Force with a large fuel depot that could take advantage of cheap river transportation and provide a central shipping point for air bases in the region.

Throughout the Korean conflict the flood of new building continued. Yet at the conclusion of hostilities the pace did not slacken as had previously been the case. The Cold War had changed the United States' defense policy and required a continuing high level of military preparedness. In the nuclear age it was assumed that the nation would not have time to build a war machine if an all-out conflict actually erupted. The advent of atomic weapons had greatly changed the nation's foreign policy. The capabilities of super bombers like the B-52 widened the American defense perimeter. No longer could the United States maintain an isolationist position as it had prior to World War II. Government leaders felt America had to take an active role in maintaining world peace. This could only be accomplished with a powerful defense system which would deter future incidents like Korea. In order to implement this manifold defense policy it became necessary to continue an extensive military construction program.

The decade of the 1950's proved to be one of the Kansas City District's most active periods in military construction. Expansion occurred at all army posts as well as at the several Air Force bases. The Corps also performed additional work on the various ordnance plants. Entering a new area, contracts



Bell Hall, a handsome red brick building, looks over the Missouri River from Fort Leavenworth's bluff. The home of the U.S. Army Command and General Staff College, Bell hall is well known to the nation's army officers.

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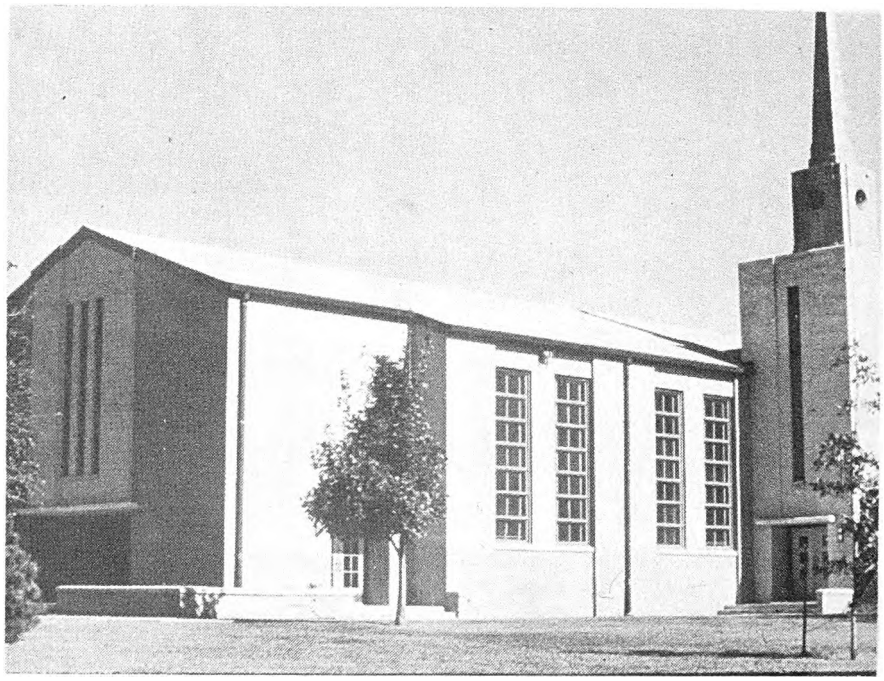
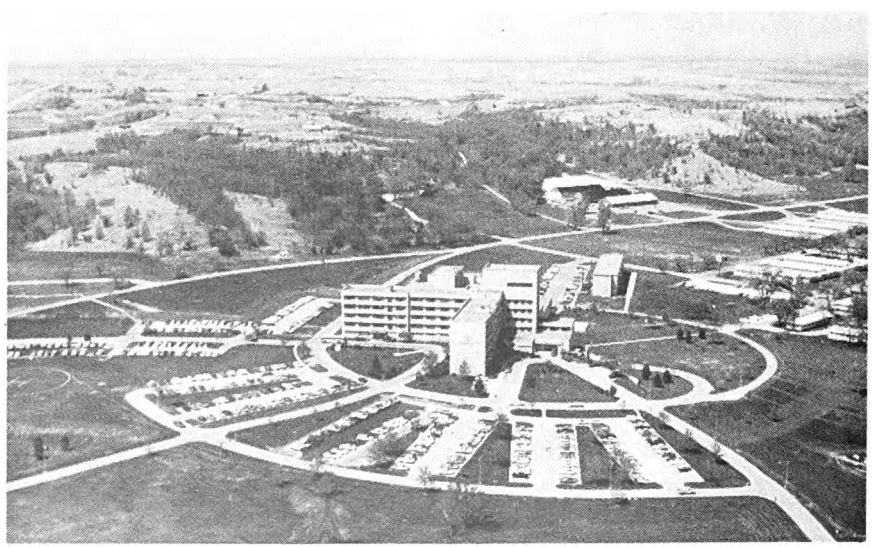


The chapel at Fort Riley combined simple modern lines with a kind of Gothic airiness.

were let to build a number of reserve training centers, both Army and Air Force, throughout the two-state area.

Fort Leavenworth, site of the Army's Command and General Staff College, received $11.3 million in new facilities. Of that figure nearly $5 million went into academic buildings including Bell Hall, the new home of the College. Officers' quarters costing over $800,000 and a new $3 million hospital increased the Fort's services.

More impressive than Fort Leavenworth's construction was the rehabilitation of Fort Riley. Over $25.5 million in installations transformed the Kansas post during the 1950's. Previously Riley had been composed



Fort Riley's Irwin Army Hospital stands on a rise at the center of a hub of medical activities.

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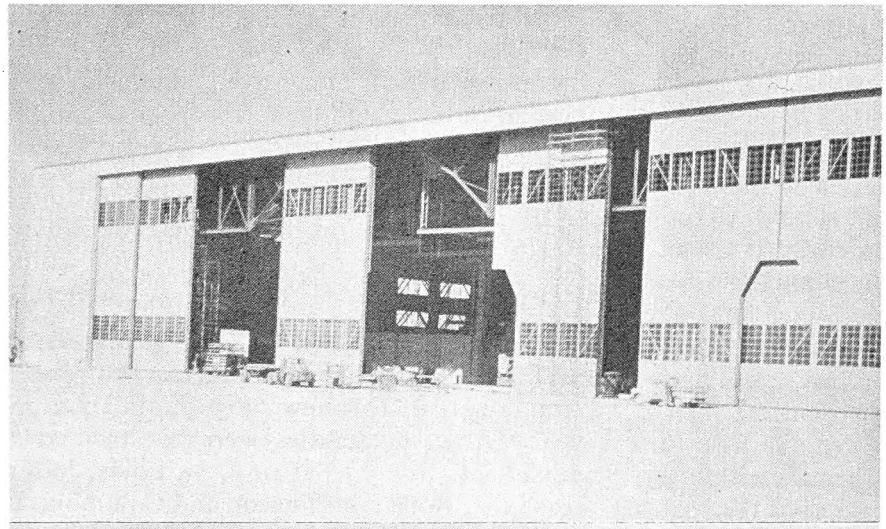
of a number of outdated and worn-out structures. The Corps made it into a new thriving community. A $340,000 gymnasium, a $360,000 theater and a $200,000 chapel all improved off duty hours. Expansion of the medical facilities came with the building of a $5.5 million hospital. The living quarters for both officers and enlisted personnel underwent upgrading with $4.1 million in new accommodations. A new regimental headquarters building and motor pool were also added during this period.

Air base construction continued at the pace begun during Korea. In the mid-1950's the Air Force adopted a policy of naming facilities for combat heroes. Thus, Wichita became McConnell; Topeka, Forbes; Grandview, Richards-Gebaur; Smoky Hill, Schilling; and Sedalia, Whiteman. Names were not all that changed. Like Fort Riley the various air bases also became communities within themselves, each pursuing its appointed goal within the nation's overall defense policy.

Whiteman Air Force Base became a training center for B-52 aircraft. To accommodate this huge long-range bomber the Corps had to carry out extensive work on the runways. The first repaving project, initiated in 1952, cost



One of the many hangars built during the 1950's at Whiteman Air Force Base, Sedalia, Missouri.

A view of the flight line at Richards-Gebaur Air Force Base, south of Kansas City, Missouri. During the 1950's Richards-Gebaur changed from a modest operation into a major base.

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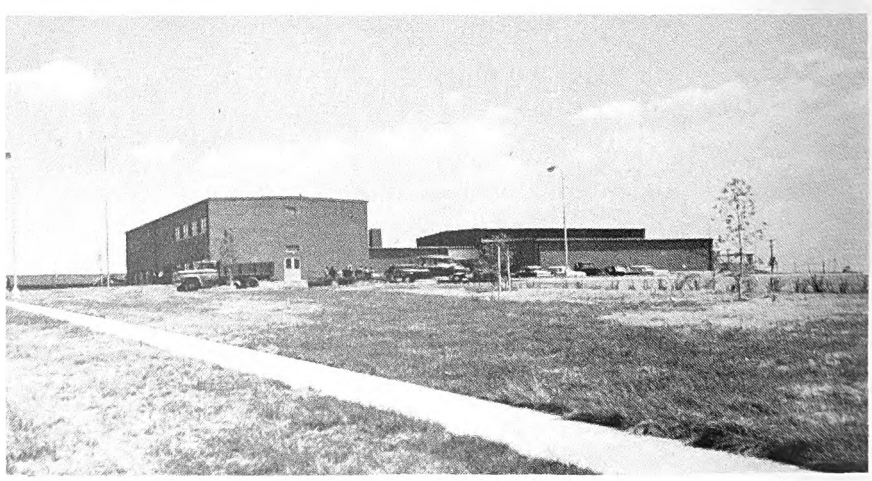
in excess of $6 million. By the end of the decade nearly $12 million had gone into runway extension and improvement of Whiteman's support equipment. Construction of a series of projects provided the base with the necessary facilities to complete its desired mission. First came living quarters for the officers and enlisted men, followed closely by hangars, warehouses, and administrative buildings. This phased work progressed through eleven stages. By 1956 it had generated over $6.2 million in construction. Additional individual projects included a million dollar hospital, swimming pool, chapel, and base exchange.

South of Kansas City at Richards-Gebaur Air Force Base the government implemented a different type of defense mechanism. The base became the station for a number of fighter-interceptor aircraft. As had been done at Whiteman, the District began another extensive construction program. The runways, originally built during World War II as an auxiliary field, received a $1.6 million overhaul. Officer and enlisted personnel housing added another $5 million in contracts. Over $300,000 went into the building of an alert hangar facility. This building, housing men, aircraft, and equipment, enabled the base to have defensive fighters in the air within a short time. As the decade progressed the base continued to grow. Various support facilities, hangars, motor pools, operations buildings, and warehouses all appeared. In 1954 the Corps began work on a new dental clinic and in the summer of 1956 started a $1.3 million hospital. Recreational areas came with the construction of the officers' and N.C.O. clubs, gymnasium, swimming pool and library.

By and large the construction projects at the other three major air bases, McConnell, Forbes, and Schilling paralleled the type work undertaken at Whiteman and Richards–Gebaur. They all grew from outdated inefficient facilities into sophisticated segments of America's overall defense system.

While work at the various air bases moved toward completion, the District supplied another equally vital part of the United States' new defense posture. This activity involved construction of numerous reserve training centers throughout the two-state area. In earlier periods the nation had time to raise and train an army after a war had started; now, however, the Cold War required a much higher degree of readiness. In order to fill this need for "citizen-soldiers" the United States embarked on a new reserve policy. Reserve centers at the community level would provide the needed training at numerous places throughout the country.

The Kansas City District carried out a sizable part of this new program. In Missouri, Army Reserve facilities were constructed at Joplin, St. Joseph, Bethany, St. Louis, Jefferson City, Rolla, Washington and Columbia. In Kansas, the centers serviced the cities of Salina, Great Bend, Wichita, Topeka, Kansas City, Lawrence and Independence. The cost per facility ranged from $80,000 at Bethany, Missouri, to $400,000 for the Kansas City,



The U.S. Army Reserve Center in Kansas City, Kansas, was typical of reserve projects throughout the two-state area.

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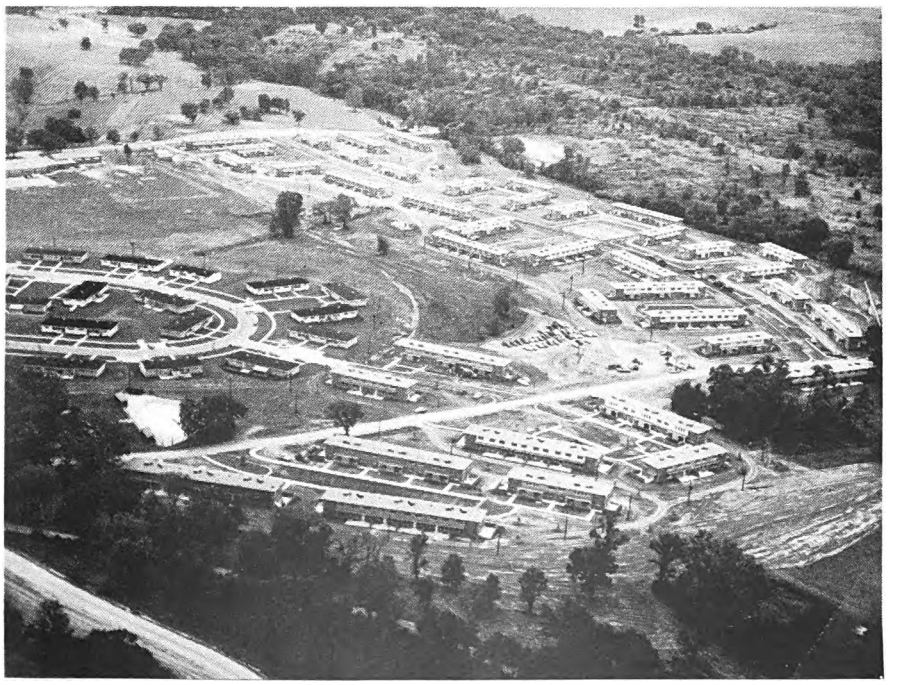
Kansas, building. The District spent over $2.7 million between 1952 and 1963 on the Army Reserve training centers. In addition to training facilities for the Army Reserves, the Corps built several Air Force Reserve complexes. The District constructed Air National Guard units at the McConnell and Forbes Air Force bases in Kansas, and at St. Joseph's Rosecrans Municipal Airport and Richards-Gebaur Air Force Base in Missouri.

As the Corps increased the efficiency and capacity of the military installations under its control the number of personnel grew steadily. Military life underwent a dramatic transformation. While the rifle-carrying soldier was not replaced, he was joined by an ever-increasing variety of technical personnel who operated highly sophisticated communications equipment, maintained multi-million dollar aircraft, or participated in numerous other specialized fields. As the military became more challenging and rewarding, many individuals turned to it as a lifetime career. This expansion of long-term personnel increased the number of family dependents, necessitating better family housing units. Thus the Corps became involved in constructing family homes.

Although the Corps had participated in this type work before, no previous projects had ever approached the magnitude of the 1950's activities. Along with the increasing scope of building, a major change in financing took place. In August of 1955 the Congress extensively amended the National Housing Act of 1934. The statute established minimum building standards, maximum cost per various units, type of utilities to be incorporated, and other guidelines for builders to follow. Another aspect of the Act involved military housing. In order to provide the large sums of money needed to build dependent housing without direct Federal appropriations, the law provided for private loans, underwritten by government guarantees, to finance on-base homes. Homer E. Capehart, Republican Senator from Indiana, received credit for drafting this amendment and shortly the various building projects across the nation took on the name of "Capehart Housing."[6]

The Kansas City District handled projects in the capacity of supervisory agent between the contractor and the Army unit. Each post determined its own needs, then contracted for the desired number of housing units. Capehart

6. Public Law 345, 84th Congress, Subchapter VIII, Armed Services Mortgage Insurance.



A Capehart housing project still under construction during 1959 at Fort Leavenworth, Kansas.

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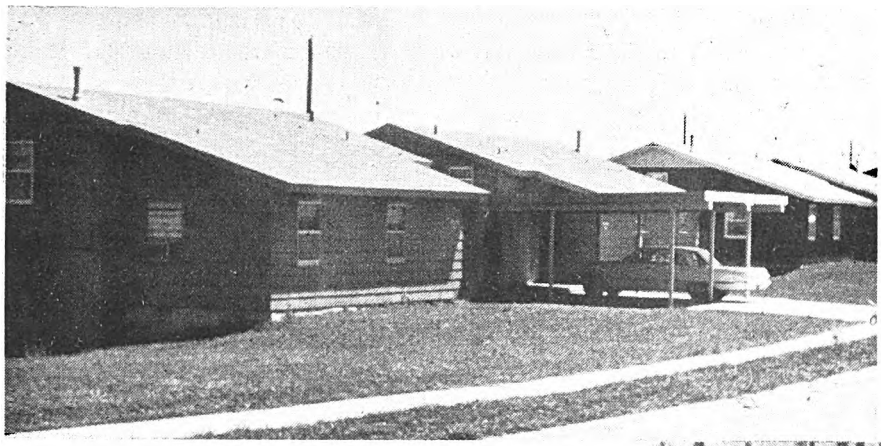
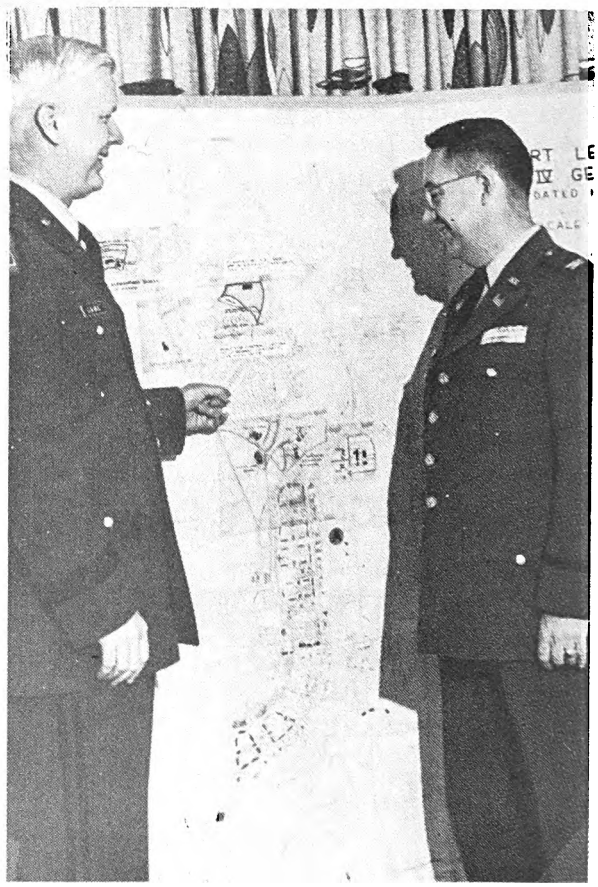


A closeup of a typical suburban duplex that formed one of Fort Riley's Capehart projects.

Housing involved only the Army, since the Air Force devised a separate housing authority. Once an installation decided its respective needs the long process of construction began. However, houses had to be designed to recognize the rank of the individual who would eventually live in them. A house for a Captain would have more square footage than one for a Sergeant and one for a Colonel more than that of the Captain and so on. Even with the problems of "privilege of rank" the three major Army posts—Forts Riley, Leavenworth, and Leonard Wood—received over $75 million in new family housing units from 1957 through 1961.[7]

Fort Leavenworth, where the smallest Capehart construction took place, was the first one started. The post embarked upon three distinct building programs. The final project included two 200-unit projects and one 100-unit project. This number appeared modest when compared to the work at Forts Riley and Leonard Wood. Using over $20 million in Capehart funds, Fort Riley initiated a series of housing complexes. An 860-unit group begun in 1961 proved to be the post's largest. It alone cost in excess of $13 million. Across the state line in central Missouri, Leonard Wood's new family houses involved the most costly undertaking. In 1958 a 1300-unit project with a price tag of over $21.9 million started and by 1961 contractors



Major Gen. Thomas A. Lane, Post Commander at Fort Leonard Wood, discussed Capehart housing plans with Col. L.E. Laurion, Kansas City District Engineer.

broke ground for an additional 800-unit facility as demand for living quarters increased. Construction of the individual housing units required additional operations; supplying the necessary utilities turned into a costly procedure. Leonard Wood spent nearly $2 million to provide its newly acquired houses

7. Ted Finkmeyer of the District Office provided much needed information about "Capehart Housing."

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with water, gas and electricity. Riley and Leavenworth followed with utility work proportionate to their respective Capehart programs.

Most of the military construction undertaken during the 1950's reflected improvements of traditional weapons. However, the defense structure experienced a dramatic change before the decade came to a close. No longer would total reliance be placed on the capabilities of long-range strategic bombers. A new weapon, the intercontinental ballistic missile, would soon become the heart of the American defense system. Years of research and development had made possible the introduction of this immensely sophisticated weapon. In 1957 when the Soviet Union launched its first orbital satellite, the Russians proved to the world that they had a rocket capable of carrying nuclear weapons around the globe. This event rushed American policymakers to the conclusion that the time had arrived to reorganize the nation's defense system.

Once again the Corps of Engineers became part of the means to implement this decision. The Kansas City District was given a two-fold assignment. One centered upon the construction of several defensive missile emplacements while the other focused on the building of offensive missile sites. The District's first project in this newly created arms race concentrated upon defensive missiles.

Metropolitan Kansas City became the center of the District's initial missile site construction. The Kansas City Defense System had been planned and it became the Corps' responsibility to turn drawing board concepts into reality. Site construction for the Nike-Hercules interceptor missile, a relatively compact unit carrying a multiple rocket warhead, started in the late spring of 1958. The cost of this project totalled nearly $6 million, a figure which increased as sites became more numerous and the system required various modifications. The Defense System incorporated four sites surrounding Kansas City: Fort Leavenworth and Gardner in Kansas, and Lone Jack and Lawson in Missouri. Olathe Naval Air Station, south of Kansas City, became the headquarters. In addition to the missile housing the District also constructed support equipment. Radar systems, basic utilities, and data link facilities all called for extensive work by the Corps.

Almost a year to the day after the Nike-Hercules project began, the District started work on a number of Atlas offensive missile sites. Forbes Air Force Base would be the nucleus of the nine missile emplacements. The

Missile site construction always involved massive earth moving activities. This view shows a Nike-Hercules site somewhere in the Kansas City area during the early stages of construction.

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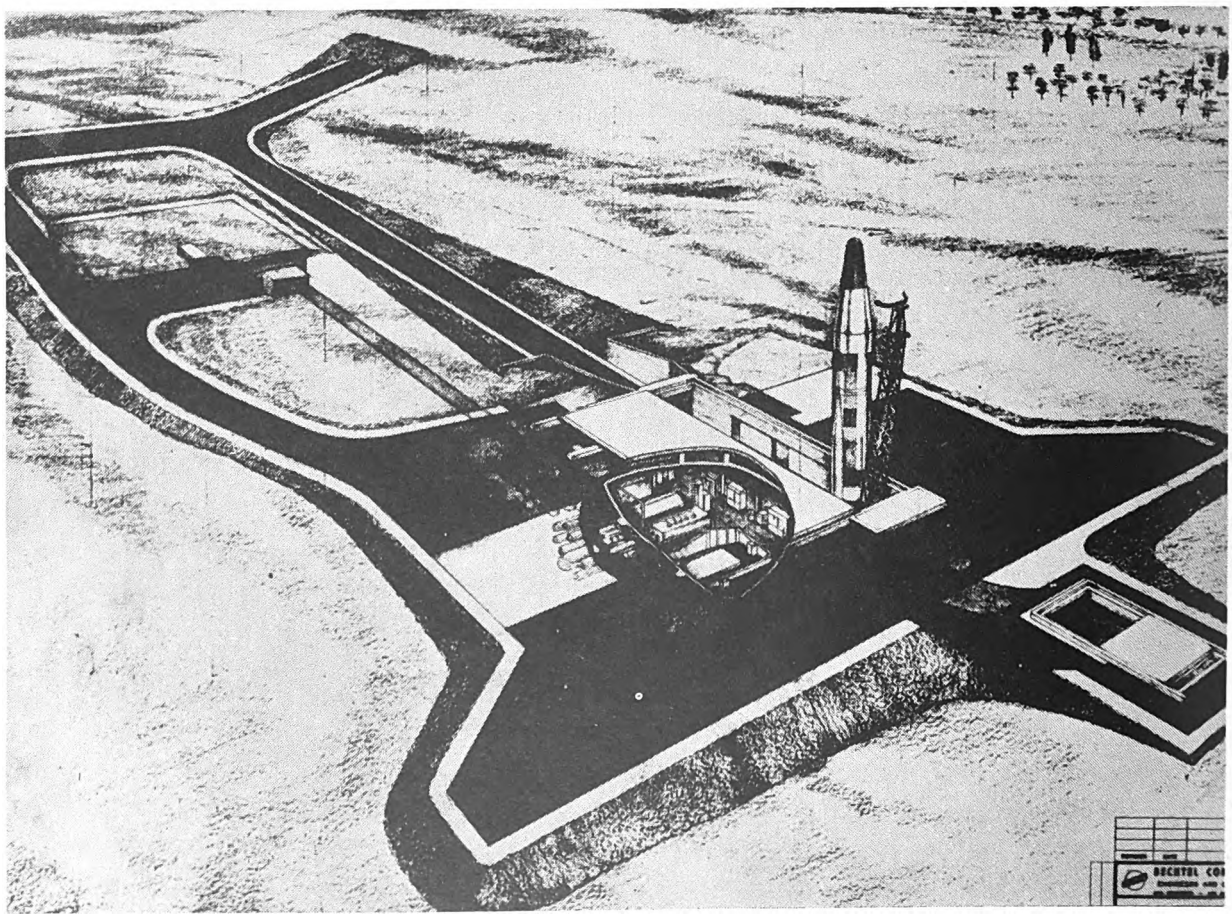
sites were divided between two different construction firms; one company would build three sites, the other six. The urgency of completion approached wartime proportions. The Defense Department wanted the project completed literally overnight. Unlike normal construction contracts which allowed for increases in building time, the contracts for the missile complexes made special provisions to speed up work if necessary. If the officer supervising the construction determined that the work was falling behind schedule, the contractor could "be required to increase the number of shifts, overtime operations, days of work, the working forces, and/or construction plant as necessary to insure the completion of work on schedule."[8]

The impending project in Kansas soon received nationwide news coverage. The Los Angeles Examiner reported the beginning of work. Then on June 9, 1959, the project officially began when George Docking, Governor of Kansas, drove a silver nail into a construction form. Docking, speaking at the ceremony, mirrored American sentiments on the new offensive weapons. He said, "What we do here today, we do in the firm belief that we are promoting the peace of the world by our action. We believe that the mighty weapon that will be installed here will serve as a deterrent to war."[9] The Cold War had entered a new and dangerous phase with both great

8. U.S. Army, Corps of Engineers, Topeka Area (Military), Missile Base Construction, Press Summary, which includes clippings from the Topeka State Journal, Los Angeles Examiner, The Topeka Daily Capital, and the Kansas City Star, provides detailed newspaper coverage of the Forbes project.
9. The Topeka Daily Capital, June 9, 1959.



An artist's conception of an ICBM complex. Here the "coffin" door (partly cut away to display the underground equipment) is open and the missile is in firing position. The opening at the lower right is the outlet of the blast tunnel.

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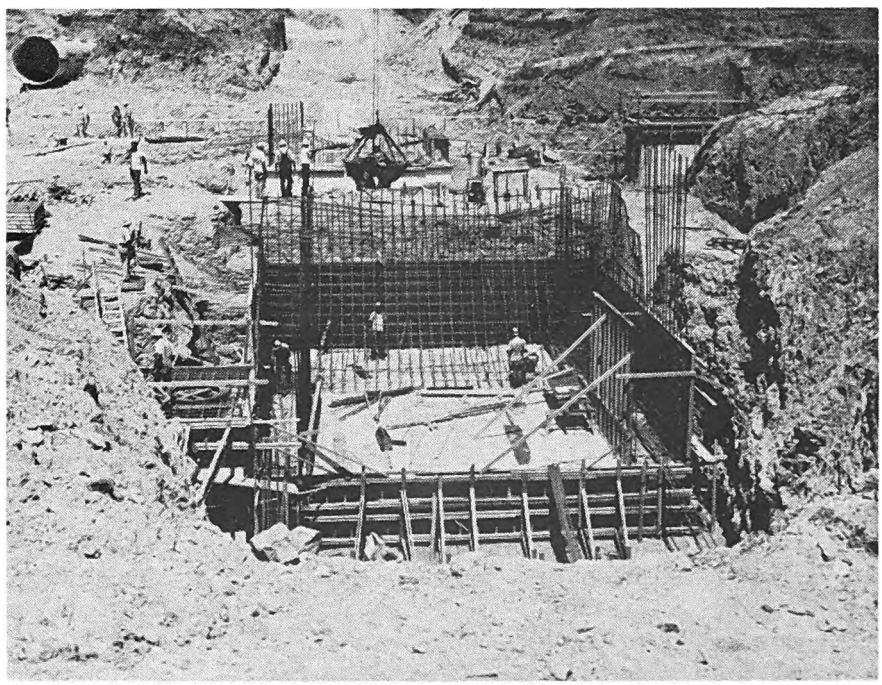
powers deploying weapons of incredible destructive power that could save the peace or destroy the civilized world.

The Atlas missile on which so many Americans placed their hopes was an extremely complicated weapon. Constructing the emplacement for such a sophisticated system challenged both engineers and builders. The missile was not stored in a firing position; rather, it lay horizontally in a "coffin" covered by an 800,000 pound door. To be fired it needed to be elevated to a perpendicular position after opening the door—a procedure that required less than twenty-six seconds! Also a great deal of work went into building extensive blast tunnels to carry rocket emissions away from the launch complex. Even though the sheer magnitude of the project produced many basic construction problems, solutions evolved as the Corps and the contractors fought to keep on schedule.

Labor-management disagreements created several well publicized work stoppages. The first occurred during the second month of construction. The dispute involved Independent Contractors and Engineers of Texas, the firm building three of the sites, and two of their equipment operators who were not paid for overtime. This dispute ended quickly, with work resuming on the same day the strike started. The following month union members from Topeka claimed the Texas firm was discriminating against local area workers and once again walked out. This disagreement lasted only three days. In November of 1960 the largest work stoppage occurred when a jurisdictional dispute arose between the hoisting engineers and the electrical workers. While the other conflicts had been isolated this one disrupted major portions of the construction. Maj Gen. Thomas P. Gerrity, Air Force Ballistic Missile Activation Chief, first flew to Forbes to confer with the District's project commander, Col. William Ruark, and then called upon AFL-CIO President George Meany to intervene. He also asked the National Labor Relations Board to issue a restraining order. The final resolution came in April of 1961 when the NLRB charged the hoisting engineers with unfair labor practices and issued cease and desist orders. In addition to labor disputes one other minor disturbance occurred at the missile construction sites



A closeup of construction of the flame pit for an ICBM site. Taken in August 1959, the work was well underway.

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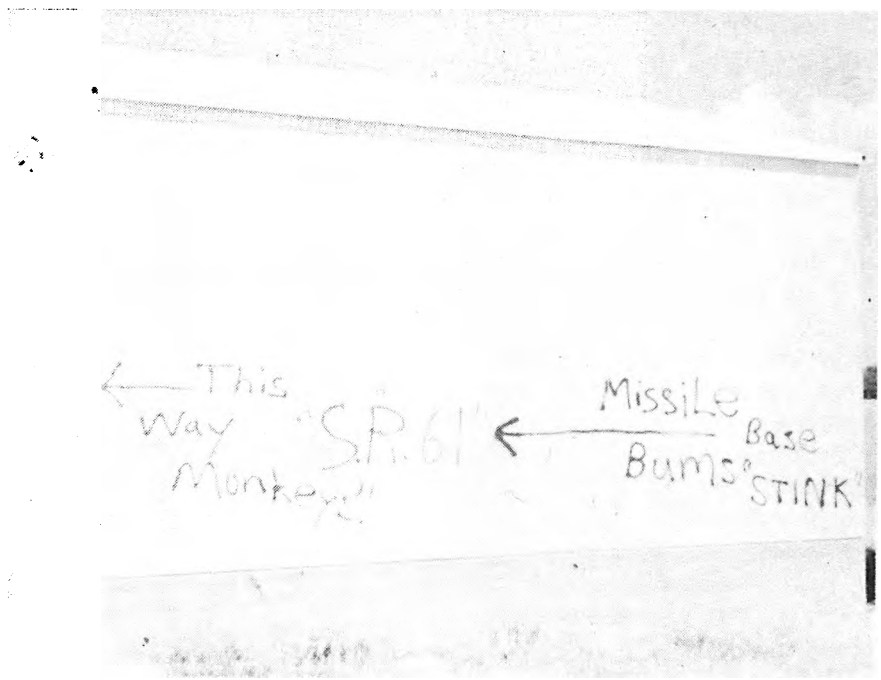
Comments left by McPherson College protestors on one of the equipment buildings at an Atlas site near Topeka.



when student pickets from nearby McPherson College who opposed missile deployment staged a protest.

Despite such interference the project continued on schedule. On January 25, 1961, the first Atlas missile arrived in Topeka at Forbes Air Force Base. By April this weapon was in place on one of the launching pads and all nine were stationed by mid-October. As construction progressed building costs increased. In 1959 the estimate for the project had stood at $26.7 million but by the completion date in 1961 the figure had risen to $36.5 million.[10]

In addition to the Topeka project the Kansas City District started several other missile sites. These included locations near Whiteman, Schilling and McConnell Air Force bases. The District did not see these projects through to their ultimate completion, although the District did continue land acquisition for the Whiteman project. Responsibility for missile construction passed under the control of the Corps of Engineers Ballistic Missile Construction Office (CEBMCO) during 1963. This move insured uniformity and central supervision of all missile construction under a single agency with headquarters located in Los Angeles, California.

Construction of numerous missile emplacements throughout the nation gave rise to another project. While many people hoped that America's nuclear weapons would deter an attack from the Soviet Union, this possibility could not be overlooked. Therefore consideration of protection from nuclear attack took place. The cost of traditional "bomb shelters" seemed far too high as well as ineffective near direct hits. Thus only protection for those who escaped the initial attack received consideration. Beginning in 1961 the Kansas City District took an active part in locating buildings that were sound enough to serve as fallout shelters for atomic bomb survivors. Actually, the Corps was not involved in building shelters but only in surveying and marking locations suitable as fall-

10. "History of Corps of Engineers Activities at Forbes Air Force Base, April 1959-June 1962," pp. 6-60; a copy is in historical file of the Kansas City District, Corps of Engineers.

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out refuges. This responsibility was later transferred to another governmental agency.

The decade of the 1950's marked the zenith of the Kansas City District's military construction. The peak fiscal year was 1953, when over $67 million went into military building projects—a figure which represented nearly 70 percent of the Corps' total military-civil budget for that year. While the 1950's created a busy period for the District, the 1960's were far from barren. Indeed the activities of the earlier decade created work in the latter one. The numerous military communities built by the Kansas City District were in constant need of repair, alteration, and expansion. The first half of the 'sixties, while not as bustling as the second, still left an impressive record.

The projects at the Air Force bases, while generating only a few major contracts, contributed proportionately to the District's work load. Outside Wichita at McConnell the Corps started the decade by constructing a precision instrument laboratory. This 1961 project cost approximately $90,000. In 1962 McConnell's chapel received a $110,000 annex. An armaments and electrical shop at $200,000 and an engine repair shop at $250,000 were built during 1964. Also, late that same year construction began on a $1.3 million maintenance dock facility. At Schilling Air Force Base, much effort went toward the missile project before it was transferred to CEBMCO. In 1960, work began on the liquid oxygen facility and the missile assembly building with a combined cost for the two of nearly one million dollars. Schilling's most costly and extensive project was not related to the missile program. It centered around runway expansion and general airfield improvements at a fee of nearly $2.4 million. The work at Forbes, Kansas' third air base, primarily involved completion of the missile sites and other related structures.

Across the state line at Missouri air bases, activities tended to parallel those in Kansas. At Whiteman, the only major projects included a $100,000 chapel annex and a runway overrun with apron paving at $500,000. At Richards-Gebaur, the 1960 building program included a $350,000 ammunition storage facility, a $250,000 electric shop, and a $90,000 addition to the base warehouse. In 1964 the Reserve section received a new hangar at a cost of $170,000. Also, in 1964 the taxiways were improved and an $850,000 maintenance dock was built.

While the early sixties did not produce complicated projects at the Air Force installations, the work at the Army posts clearly compensated. Building in both states continued much as it had during the busy 'fifties. On the Kansas side at Fort Riley, the first work, initiated in January, 1960, was the construction of a $100,000 operations building. In March of the same year, the District updated the sewage treatment system with a $200,000 addition. To benefit Riley's aircraft activities the Corps built a flight simulator building. By 1963 the District engineers completed the design and began work on a $135,000 aircraft fuel storage and dispensing facility. In 1964 and 1965 construction of a new $500,000 chapel center, a $275,000 enlisted women's barracks, a $700,000 BOQ, and a $400,000 dental clinic all started.

Continued improvements and additions also took place at Fort Leavenworth. The 1960 projects included a $120,000 communications building and a $250,000 emergency generating facility. Also in 1960 the Corps built a $300,000 Nike-Hercules field maintenance facility to service missiles from the Kansas City Defense District. In 1962 nurses and WACS received a new $310,000 facility. Major projects during 1963 focused upon a $1.5 million general additions and alterations construction contract. In 1964 the disciplinary prison obtained a $300,000 new parolee barracks. Construction of an $870,000 barracks complex for enlisted men and women began in April, 1964. An outpatient clinic, water storage facility, post chapel and educational center all began in the same year.

In Missouri Fort Leonard Wood had a building schedule that approached massive proportions. Toward the final years of the 1950's a number of Army posts were being closed while others were undergoing thorough expansion programs to absorb transferred personnel. Fort Leonard Wood was of the latter

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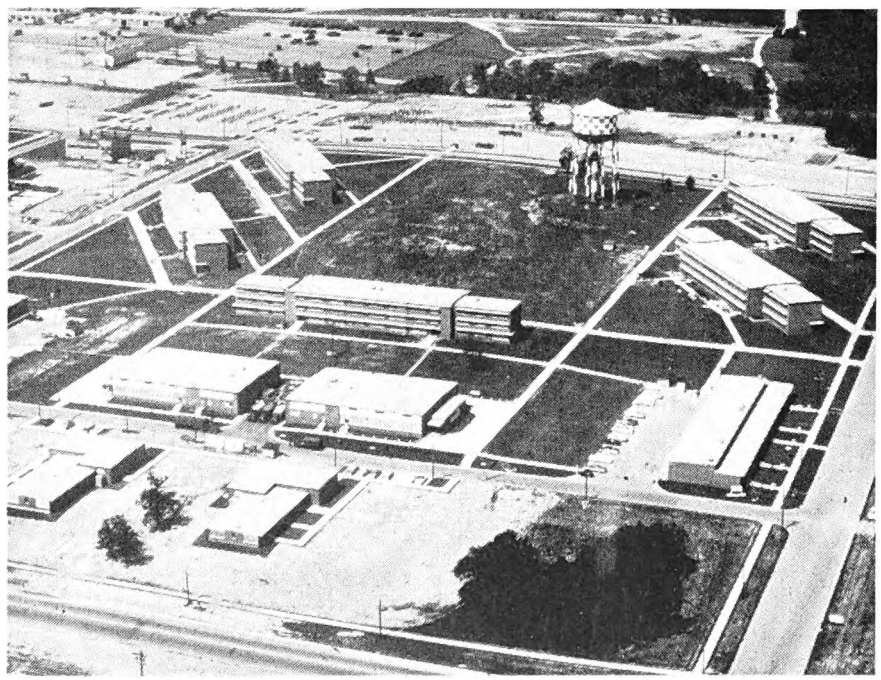
The enlisted women's barracks at Fort Riley provided improved living conditions for the Women's Army Corps.



This view of the 3rd regimental area at Fort Leonard Wood, Missouri, shows the scope of construction during the middle 1960's.

type and it had to be expanded to meet its new role. The Fort became a staging area for Army personnel as well as taking on responsibilities for basic training. The building plans centered around the construction of several regimental areas. Each area incorporated everything necessary to operate as a self-contained unit. Facilities included barracks, mess halls, training buildings and administrative headquarters. The building program planned by the Kansas City District would occur in a step-by-step manner. For example, the first regimental area was broken into seven increments which were built over a period of several years. Between 1958 and 1965, while building three separate regimental

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Typical of support facilities constructed during the 1960's was this post theater at Fort Leonard Wood, Missouri.

areas, the District engineers held the responsibility for over $34.6 million in construction funding.

Building also took place in other areas at Fort Leonard Wood. In 1960 the District supervised the $650,000 water treatment plant. During the next spring work began on a $400,000 chapel center. Over the following three years the District awarded a $7.1 million contract for a health facility, a $700,000 commissary, a $400,000 dental clinic, and a $2 million BOQ.

The key defense policy during the first half of the 1960's had been missile development and deployment. However, Kansas City's involvement in this had been brief. Once CEBMCO took over, the District returned to more traditional military construction. Between nuclear and conventional arms, the United States, while hoping to avoid all wars, was prepared for either a major or a minor one. The second half of the 'sixties witnessed the evolution of a minor military assistance program into a sizable limited war. Exactly how the deepening commitment to South Vietnam became the "Vietnam War" was not clear, yet the supporting role played by the Corps of Engineers was. Vietnam, like Korea, would not be fought with atomic missiles but with traditional weapons. Conventional warfare needed men, equipment, training areas and other kinds of support. District personnel at Kansas City, as they had in the past years, geared up to provide the new construction and rehabilitation work which would assist the American mission in Vietnam.

Weapons underwent many changes in the years that followed World War II and Korea. Rifles had become lighter in weight and less cumbersome, artillery pieces had improved in effectiveness, and other weapons had followed a general pattern of sophistication. Yet all the new equipment maintained a tie with the old—it needed ammunition to make it work. As American defense machinery prepared for a conflict which would place over 500,000 men in the combat area, many ordnance plants had to be reopened.

Unlike the situation when the Korean conflict began, most munitions plants were not in sorry states of disrepair. Although better conditions existed in the "stand-by" units, increased demands required a number of rehabilitation and alteration projects. In Kansas, the District focused efforts upon the Sunflower and Parsons works. At Parsons, the

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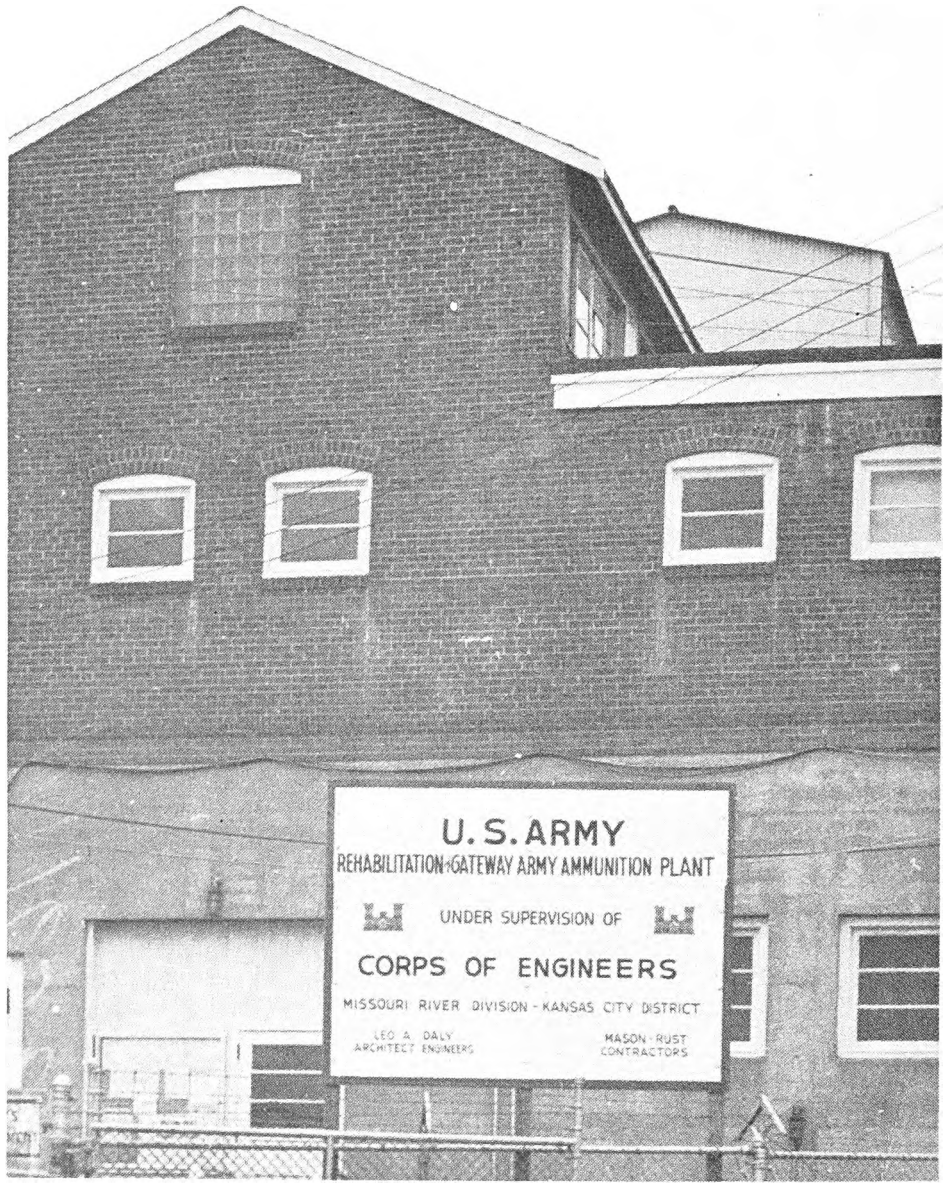

In the great rush to obtain production of 175mm shells, the Corps ran into serious labor problems at the Gateway Army Ammunition Plant.

Corps spent $15.5 million to modify the Kansas Army Ammunition Plant starting in the winter of 1967. By November of 1969, the Engineers began adding a $280,000 fire protection sprinkler system to the plant. Following government standards on air quality, the District installed $120,000 in pollution control equipment. At Sunflower, construction operations were not this costly but between 1966 and 1969 $1.3 million went into modification contracts. The most costly project came in February of 1970 with the installation of an $800,000 electrical power substation.

Tooling up to produce munitions created a number of problems. In April of 1967 the St. Louis Army Tank Automotive Steel Foundry,

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built during World War II, returned to active status with its name changed to the Gateway Army Ammunition Plant. A severe shortage of 175 mm shells led to a conversion contract based on the old style "cost-plus" type contract. Mason-Rust, the contractor, hired laborers from Local 42 of the AFL-CIO, but soon found itself faced with padded payrolls and other "feather-bedding" problems. In February, 1969, **Life** magazine exposed the activities of alleged "mob" controlled unions and eventually the FBI and U.S. Attorney in St. Louis took action. This period of labor conflict proved costly to the project. Gateway, scheduled to start production of shells by July, 1968, did not begin until December. The original figure of $8 million almost tripled with final spending totalling over $22 million.[11]

Another St. Louis area project that ran into difficulties was at Weldon Spring. In 1940-41 the Quartermaster Corps had constructed an ordnance plant for the production of TNT at this location some thirty miles from St. Louis. It ceased operation at the end of World War II and the War Assets Administration disposed of part of the holdings while placing the basic plant in the National Industrial Plant Reserve. This condition existed until 1955 when the Atomic Energy Commission started processing uranium and thorium ores at the facility. However, in 1966 the AEC ceased operations and again the plant stood unused. Soon after this the Army decided that it could convert Weldon Spring to chemical manufacturing and produce Herbicide Orange, a defoliant being used in Vietnam. Early estimates suggested that decontamination could be completed for one million dollars. Unfortunately, this was not to be the case. The initial rehabilitation contract amounted to almost $11 million while total conversion would cost over $27 million. As the contractors ran into serious problems with high levels of radiation other conditions changed. The demand for defoliant decreased as private industry's ability to produce it increased. Thus the project was suspended before completion. The total cost to the taxpayers was $13,248,000. This could be considered a terrible waste, yet the Corps was trying to carry out national policy during a period when political and military priorities were changing almost daily.

At the Lake City Army Ammunition Plant the ever-increasing workload called upon the District engineers to employ a variety of their construction abilities. During June of 1965 work started on a $100,000 electrical substation. The following spring contracts were awarded for a one million dollar modification and alterations contract. In addition to these specific contracts the District program included several general rehabilitation projects. This brought Lake City additional construction totalling over $2.1 million. General construction continued into 1970. Major programs that year were a $1.1 million air compressor substation and a $450,000 industrial waste facility.

Construction at military installations, both Army and Air Force, took on patterns which reflected their respective missions during the Vietnam effort. Work at the various army posts tended to overshadow that of the air bases. This occurred when many Air Force units were transferred to the combat zone from the two-state area. B-52's from Whiteman and several fighter units from Kansas joined the shift to Vietnam. As Air Force needs declined with personnel and equipment reductions, construction priorities focused upon the Army.

To augment Fort Leavenworth's Command and General Staff College the District engineers provided the post with a new war gaming facility. This project, started in May of 1967, cost a modest $150,000 because it involved only remodeling a former stable. That same month construction began on a $300,000 dental clinic. Between 1967 and 1970, the Corps provided the Fort with several new housing subdivisions totalling over $2 million. Living accommodations were also the target of a $350,000 rehabilitation project. During the autumn of 1968 contracts were awarded for the construction of a $270,000 data processing building. The major project in 1970 focused upon a $600,000 improvement of the United States Disciplinary Barracks.

As the requirements at Fort Riley increased

11. **Life**, Feb. 14, 1969, p. 52.

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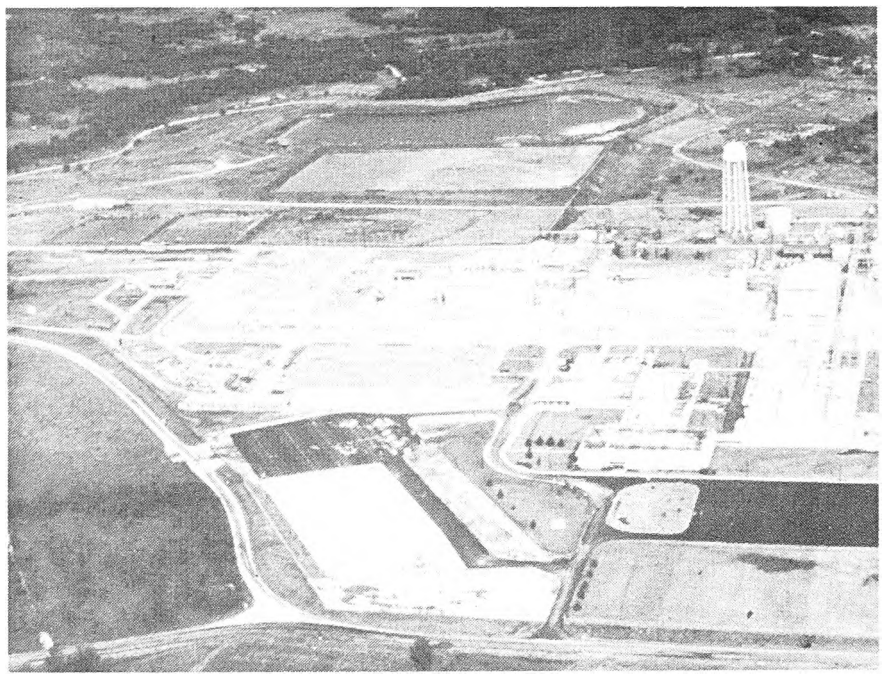
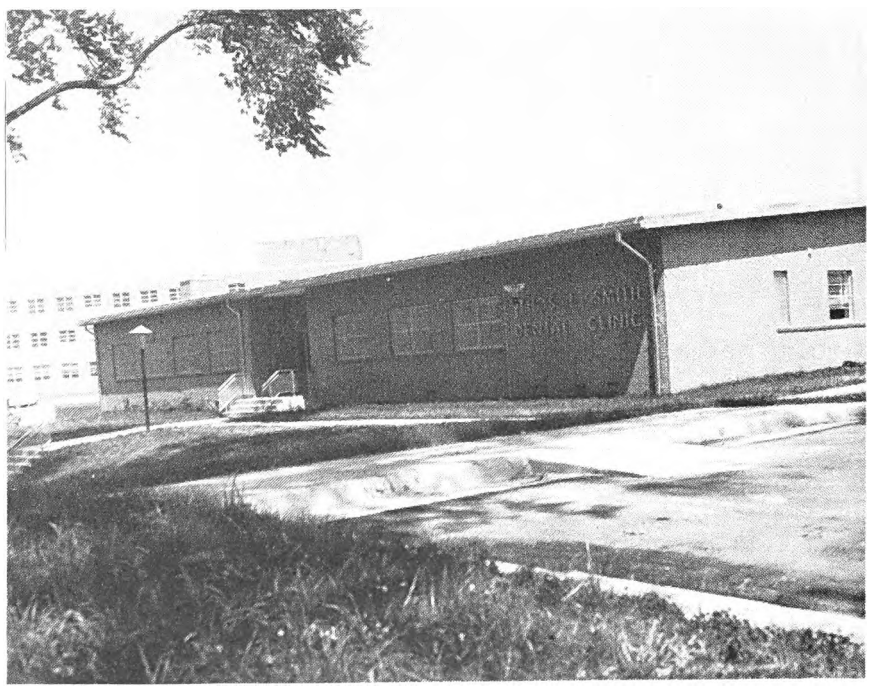
The sprawling Weldon Spring Plant proved to be a taxing problem when the District tried to convert it to the production of a defoliant during the Vietnam War.



Fort Leavenworth's Thomas L. Smith Dental Clinic augmented medical facilities available on this historic post.



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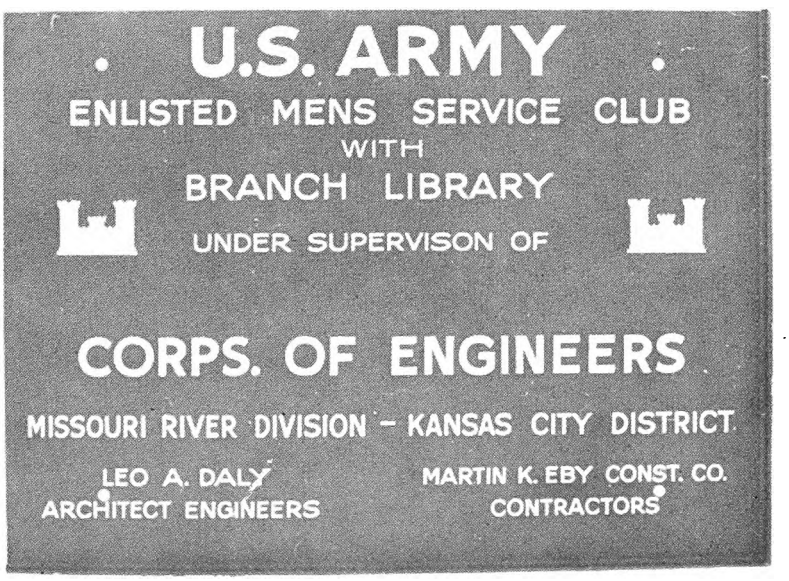
the District responded with several major expansion projects. In 1967 construction included two enlisted men's barracks complexes worth nearly $2.5 million. Increases in personnel required expansion of the Fort's training capabilities. Six new tactical buildings costing $3.5 million were started in March of 1968, followed in the summer by work on a $1.5 million tactical range complex and $1.5 million in other miscellaneous training buildings. Riley projects during 1970 included a $370,000 sewage plant and a $1.3 million commissary.

In Missouri the work at Fort Leonard Wood ran parallel to the activities in Kansas. During 1966 work commenced on several classroom additions costing nearly $2 million as well as a $700,000 theater. In January of 1967 the District awarded contracts for the construction of a $700,000 rifle range. The building of the several regimental areas which had begun during the 'fifties continued as work started on the Fifth Regimental Area complex in 1968. The contract for this project totalled over $14 million. Another 1968 project was the construction of an enlisted men's service club and library at a cost of nearly one million dollars. In 1969 an additional $1.2 million was spent on a barracks for enlisted men.

While the Kansas City District continued to implement the building policy needed for the Vietnamese conflict, discussions were underway at higher levels. The decisions made concerned the future supervision of military construction. During the summer of 1970 the Missouri River Division at Omaha assumed all military construction responsibilities.[12] Once again Kansas City reverted to strictly civil projects. With the transfer of military building the District ended twenty consecutive years of work on defense installations (including World War II the total time was twenty-seven years). Viewing this period in terms of overall production the District left a very impressive record. Yet it does not belong entirely to the

12. Kansas City District Information Bulletin, Aug. 3, 1970.



Whether farming behind an agricultural levee, boating on a reservoir, or serving in the Army, one might see the familiar turreted castle with the description of just what the Corps was doing at this particular location. Here the troops at Fort Leonard Wood could look forward to additional recreational facilities.

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Corps.

Part of the credit for the finished product belongs to the various civilian construction, architectural and engineering companies that did the actual building. They worked as an integral part of the Corps in implementing the defense policies of the United States. Whether a $100,000 ordnance storage unit at Forbes Air Force Base or a $22 million Capehart housing project at Fort Leonard Wood, the civilian contractors did their part.

Equally as impressive as the number of projects completed was the amount of money spent. Between 1940 and 1970 over $1.73 billion went into Kansas City District military contracts.[13] This expenditure has been the point of much criticism over the years. Clearly it represented a vast amount of money. Yet where did it go? Most of the funds went to the hundreds of contractors who participated in the Corps' building programs. From the contractors the dollars went to the workmen and their families. In essence the bulk of the Corps' spending went directly back into the national economy. Thus the Kansas City District, while maintaining an effective arm of America's defense structure, also directly stimulated the economy of the Kansas-Missouri two-state area.

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13. **Ibid.**, also more specific details are in the already noted 1501-07 Military Construction Reference Paper File, and List of Contracts, Fiscal Years 1955-70, a copy is in the historical file of the Kansas City District, Corps of Engineers.

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CONCLUSION

Cataloging the surveys made, the proposals presented or the projects constructed tells us what the Kansas City District, Corps of Engineers has done for the last six and one-half decades. Yet in some ways this misses the mark. Taming the mighty Missouri is the story of people—a few (like District Engineers who are quoted in the above chapters) are identified by name; most are nameless. The men who carried on the ancient craft of weaving willow mats, or who swung pick-axes or struggled to heave "one man" rock from a barge to the bank can be seen in old photographs but are seldom named. As the years moved on a vast army of men and women stood beside the "river rats." Real estate experts who seldom if ever see the river, clerks and secretaries who keep the bureaucracy moving, specialists in data processing, photo-copying or engineering who turn concepts into plans and hundreds of others make the District operation a reality. Although few individuals will find their names in the preceding pages, it is their history that .truly unfolds.

Just as the District's major achievements dot the Missouri basin landscape, so also are there many projects that never went beyond the proposal stage. Indeed the frustrations that the Corps has encountered abound in the written record and the memories of "old timers." The three major kinds of obstacles faced by the District involved Congress, local citizens, and world events. While occasionally some disappointed engineer might believe there is a conspiracy against flood control or navigation, it is more likely that forces beyond the control of any few people are involved. The United States Congress has concerned itself with improving river transportation since 1824, yet again and again priorities have changed and efforts have been redirected. Very much involved in this is the nature of representative government. Some congressmen saw spending for "internal improvements" as a way to improve the nation as well as their own chance of reelection. The result was spirited competition for each and every federally financed project. Soon the term "pork barrel" began to be used to describe legislation for building projects. Since many of the improvements were to waterways and bays, the annual river and harbor bill became the most notorious of the "pork barrels." In time many congressmen decided that aiding each other's pet projects was better than fighting for only one. The technique received the label, "log rolling," and it increased the disconnected and wasteful nature of Federal appropriations. With this approach, it was difficult for the Corps or the Missouri River Commission to draft basin-wide plans. It seemed that work was always needed in a district where the representative lacked political power; but it was never done.

If too much spending in the wrong places did not cause enough frustration, then too little spending everywhere surely could. This occurred in those periods when there was either a great public outcry against "special privilege," or a general trend away from government in the economy. Sometimes retrenchment was natural as when in the late nineteenth century railroads seemed to end the need for river transportation. On other occasions it was merely a "conservative" movement that led to overall budget cuts. By the mid-twentieth century, general long range planning—best exemplified by the Pick-Sloan Plan—had done away with more violent swings in congressional support. Even so it was still difficult to predict if Congress would cut back already authorized projects in order to fight inflation or for some other reason. For those working close to the problem the reductions seemed to make a hard job more difficult.

Frustration with people in the Missouri basin involved a different kind of conflict. In its simplest terms, it is a contest between those changing the environment and those who want the **status quo**. Most often the crunch comes when the District proposes a reservoir at a specific location. Obviously, a lake inundates hundreds of acres of bottomland as well as requiring the relocation of farms, towns, and public rights-of-way. To

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start with it is a very expensive operation. People who are about to see the community where their families have lived for many generations falling to the wrecker's ball, quickly suggest that all those millions of dollars could be better spent in other ways. The tax loss, the destruction of historic sites, or the despoilation of nature are other arguments that follow. Of course every one of them is true. Money is spent, the environment is changed and local lands are taken off the tax rolls. Why then build dams? The answer is as simple as the question: to protect lives and property is worth local disruptions. Needless to say, it would be beyond human capabilities for any single agency to obtain unanimous agreement on a project. That is why governments have the power of eminent domain; at some point the greatest good for the greatest number must be the controlling factor.

One of the Corps' major problems is not that projects cannot be carried out after presenting offers to purchase land, and if necessary court action, but that "public relations" is such an important on-going part of its overall effort. A great deal of hard feelings and controversy at one damsite makes the next project even more difficult. The Engineers must continue to point out the necessity for projects without "over selling" on the basis of fear or lapsing into "I told you so." This latter statement is no doubt often tempting. The years of opposition to Tuttle Creek has been discussed earlier. Yet when the flood of 1951 covered Manhattan with several feet of water, many long time critics of the "big dam" called for immediate construction. The story occurs again and again in and out of the Kansas City District. In April of 1973 the **Kansas City Star** carried an article relating to the change in attitude of residents of the Grand River valley in northern Missouri. For years they opposed Pattonsburg Dam—indeed the newspaper gave detailed coverage to the town's effort to "stay alive"—but after the numerous floods in early 1973 many people told reporters they favored building the project. Support ten or twelve years earlier would have avoided the later damage; even so the District must gratefully accept the changes of heart without reference to previous resistance.

While opposition from "environmentalists" has been discussed before, it needs mention in this context. Legal suits to prohibit Corps projects could be called the "unkindest cut of all." For decades the Army Engineers have sought (often in conjunction with the Department of Interior and Agriculture) to protect the land not only from ravages of flood but from damage by drought or erosion. District personnel have long comprehended the need for ecological balance. Protection of property on the flood plain was always viewed in relation to the natural action of the river. Although mistakes about how to regulate and control the Missouri occurred, they did not involve a conscious effort to destroy the natural environment. Indeed, the balance between kinds of agriculture, public use and wild life has consistently concerned the Corps. When reservoirs were included in the Flood Control Act of 1936, the concern about "impact" increased. In recent years the District has reworded its public statements in order to stress its environmental objectives; it has also made a great effort to cooperate with groups interested in the environment.

The final cause of frustration is the least connected to what the Corps does. It can be argued that magnificent presentations can convince Congress of a project's worthiness or that public relations can "sell" the District's inhabitants on a project. The same cannot be said about the German Empire's decision to back Austria in 1914, Japan's bombing of Pearl Harbor in 1941, or the North Koreans' march south in 1950. Great military crises dramatically affected the District not only in what they stopped doing but also in what they started to do. Civil projects found themselves on the shelf while military construction became high priority. Unlike other kinds of resistance to progress, wartime leads to increased workloads. Yet there is no doubt that the first love of most Army Engineers comes with civil projects that tame rivers, control floods, or improve water quality. This, of course, is the unique nature of a branch of the military whose basic impact is in the civil sector.

Of the numerous tasks undertaken by the District no single one can be identified as the most difficult. Often "firsts" generate perplexing problems. Nineteenth century bank

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stabilization, 1930's dam construction, or 1950's missile emplacements all provide examples. More important is the ongoing nature of planning within the midst of change. The **Annual Report** always discusses the "existing project" and usually indicates a percentage of completion. While the facts are true they are somewhat misleading. There really never is an absolutely fixed project. Restudies that are constantly underway change the project after Congress adopts a new "existing project." This evolutionary character of the District's work is an absolute necessity. Since almost everything is in flux it would be foolish to think in terms of fixed projects. When the Pick-Sloan Plan became law many people thought a basin-wide program was set. Nothing could have been further from the truth. Although the Plan's **aims** may stay constant, the implementation needs constant revision.

A quick survey of the factors in transition shows why the District's operations continue to change. Technology has improved to such an extent that building tasks which were impossible 30 years ago are considered routine today. Earth moving equipment can carve dams or create levees that hand labor simply could not economically match. Population shifts have required flood protection in places that were pastures or thickets when General Pick was preaching flood control. The demand for water has increased as pollution abatement requirements have become more stringent, and consumption by domestic and industrial users has grown. Indeed, the Federal Water Supply Act of 1958 tied flood control reservoirs to water quality. As the population of the Kansas River valley expanded the many lakes in the basin became even more important in the overall environmental picture. Almost any other social or economic change can be related to the Corps' general program.

Before modifications in the project are approved it is necessary to review the situation and then make proposals. Formal requests for studies come from Congress and (after completed and passed through the normal channels of the Corps of Engineers) are finally published as House of Representatives or Senate documents. This has been the format for over a century. Some reports are brief and insignificant; others long, complex and important. Few ever become well known. An exception to this was the famous "308" that provided for a detailed survey of the nation's rivers. In addition some of the work done in the 1907-12 period produced a foundation on which both navigation and flood control would be built. Often the reports contain historical summaries, current economic conditions, and predictions of future growth. Proposals for navigation or flood control projects are placed in the context of the future lives of the people of a river valley. Thus they are of great value for information about economic, social, or political development. The tragedy is that few people are aware of their existence.

As the Corps continues to review how to reach its final goals, it must face numerous interruptions. The most distressing distraction is the one thing the Engineers work hardest to eliminate. It is, of course, a major flood. The very system exists to control the excess flow of water. If the whole project were completed and in perfect repair, anything less than a super-flood could be held in check. More than likely the day of perfection will never come. A great deal of agricultural land is still unprotected by dikes and will remain so unless drastic changes in "economic justification" for building levees occurs. Also opposition to dams continues to hinder protection on several Missouri River tributaries. Finally, even if the system were complete, a combination of circumstances could overtax the system at a specific locality and do great damage. Thus when the river reaches flood stage and the District goes on emergency status all personnel must try to make an incomplete and imperfect system work to the utmost. The damage reports for the District since the late 1950's indicates the level of success. Yet no one knows when a "500 year flood" will take place or how local conditions will change its impact. The people of the District stand ready, while hoping they do not have to use the defenses they have created.

Many changes have occurred since the Kansas City District came into being. Boundaries have been changed, projects have been

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modified, and great progress has been made. For District personnel long-range programs have been intermingled with short term emergencies as they sought to tame the mighty Missouri. A flight over the wandering river shows the degree to which the powerful stream has been controlled; a swing up one of the many tributaries displays vast reservoirs and flood control projects. Much has been done, just as much remains to be completed. The people of the District, past and present, deserve praise for a difficult job well done.

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BIBLIOGRAPHICAL NOTE

Writing the history of a large and active agency involved many challenges. Vast quantities of records were kept, yet frequently they provided limited aid for a relatively brief overview. The materials at the District holding center in Kansas City and the Division at Omaha yielded several important transcripts of hearings on flood control that were extremely helpful. The correspondence in the Federal Records Center was mostly too detailed to be used in a general history. In fact, the archival material could lead to a book-length treatment of almost any topic covered in this history.

Several books were helpful in specific areas of inquiry. Neal James Primm's **Economic Policy in the Development of a Western State: Missouri, 1820-1860** provided a general treatment of steamboating on Missouri's rivers. Henry C. Hart's **The Dark Missouri** was literally a biography of the river and the basin. It also related navigation improvements to national policy. Dan Saults' **The Rivers of Missouri** yielded several important facts. Rufus Terral in his **The Missouri Valley: Land of Drought Flood and Promise** reviewed basin-wide problems, while Marian E. Ridgeway's **The Missouri Basin's Pick-Sloan Plan: A Case Study in Congressional Policy Determination** detailed the politics of the basic navigation-flood control project. Finally, Lenore Fine and Jesse A. Remington's **U.S. Army in World War II, The Corps of Engineers: Construction in the United States,** while covering the whole country gave many helpful details about Kansas and Missouri.

Three series of government publications proved invaluable as sources. First, the river and harbor acts were collected in three volumes entitled **Laws of the United States Relating to the Improvement of Rivers and Harbors.** This set terminated in 1940, thus requiring reference to the U.S. Code for later laws. Second, the **Annual Reports** of the Chief of Engineers, U.S. Army traced each year's progress in detail. Major construction activities were listed along with summaries of other work. Last and most important in terms of proposals, were House Documents. These publications were often the District Engineer's studies augmented with review statements by Engineer Boards and the Chief of Engineers. Tradition has led to publication by Congress rather than the Corps itself. In many ways this was a wise decision because libraries designated as depositories automatically received these important sources. Without these government publications writing the District's history would have been impossible.

Material generated by the District and usually "published" in a mimeographed form also proved of great value. The annual series called **Report on Flood-Fighting, Rescue and Rehabilitation in the Kansas City District** gave details on several important disasters. Numerous "handbooks" on reservoir recreation projects were valuable. In addition, copies of reports covering everything from environmental studies to the feasibility of agricultural levees aided the research.

Numerous items of great value turned up in the District historical file. Diaries, collections of newspaper clippings, transcripts of hearings, executive logs and the like shed light on many subjects. The District Library also provided aid and support. A complete run of **Engineering News-Record**, a professional journal, supplied several items of importance. Most of the books cited above were also easily available there. One real gem in the library was the original minute book of the Missouri River Commission. The handwritten entries for 1884 and 1885 were impressive primary sources. The Kansas City District Information Bulletin yielded several specific tidbits as well as a great deal of general information.

Since the Kansas City District is an active ongoing operation, much of its history is in file drawers of functioning offices. The willingness of everyone in the District to take time to find material for the historian is deeply appreciated. Often just wandering from office to office would result in a whole new package of material. This was especially helpful on military construction since little

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material on this subject was in the historical file or the library.

Finally, the importance of oral history needs to be noted. Many people spent valuable time reporting or recalling events long past. Rather than list names (and thus surely forget several important ones) a general "thank you" to all those who assisted in this way is gratefully extended.

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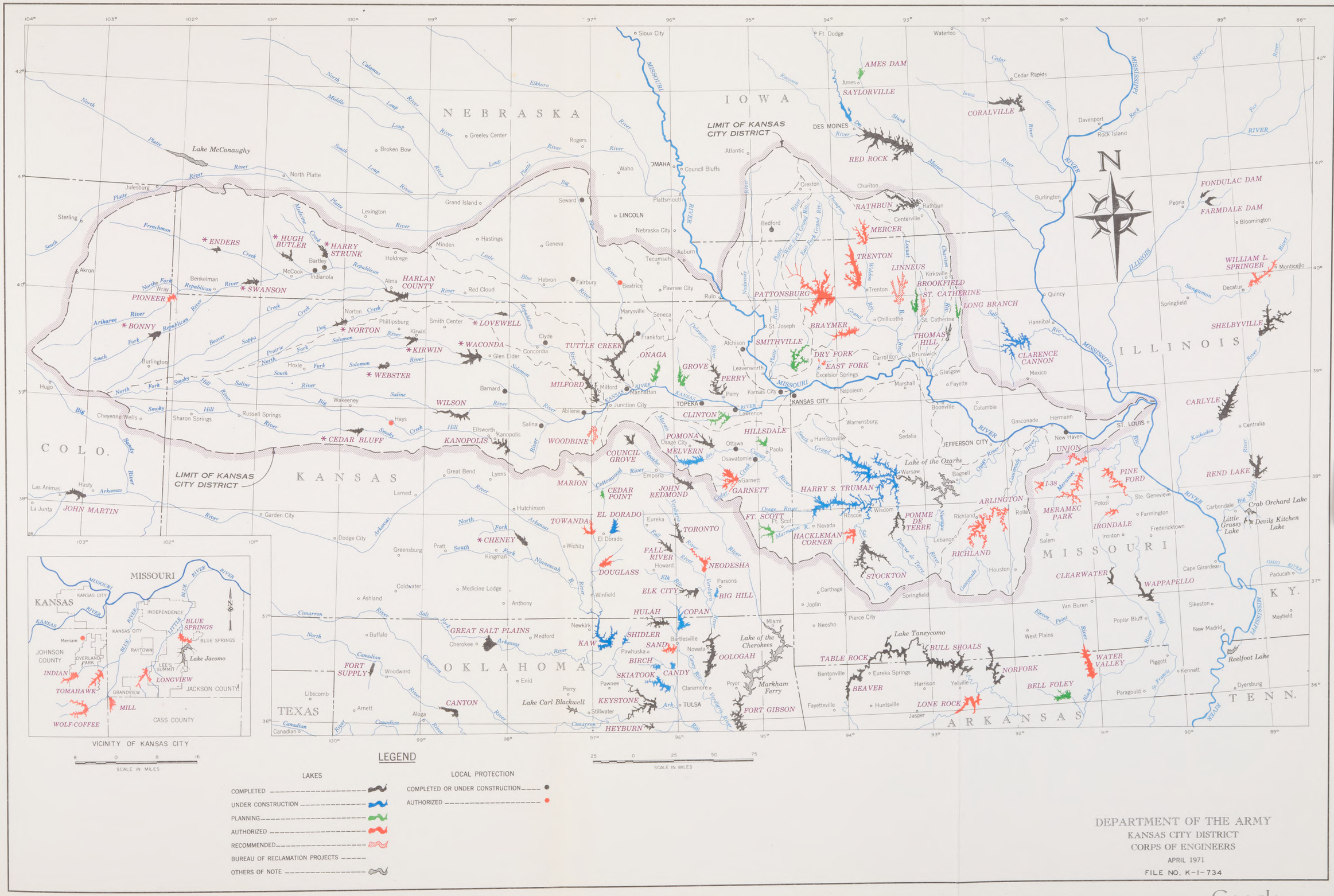
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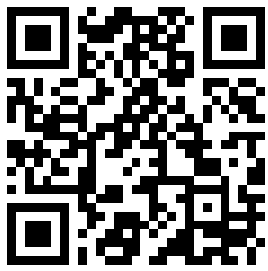
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